POSTPARTUM FAMILY PLANNING AMONG WOMEN ATTENDING GROUP-BASED ANTENATAL AND POSTNATAL CARE IN KENYA AND NIGERIA: A CLUSTER RANDOMIZED CONTROL TRIAL

by

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ABSTRACT

Background

Postpartum family planning (PPFP), or modern contraceptive practice within one year postpartum, promotes maternal and infant health through healthy pregnancy spacing. Although most postpartum women in low-and-middle income countries prefer to avoid pregnancy, few practice PPFP. Research suggests that group based antenatal and postnatal care increases PPFP uptake; however, the mechanisms behind this relationship are not yet understood. This dissertation aims to fill this gap by investigating PPFP among women who participated in a cluster randomized control trial of group versus individual antenatal and postnatal care in Kenya and Nigeria.

Methods

Qualitative and quantitative methods were employed. Inductive content analysis of qualitative data from women and providers in group care explored how this model of care may influence PPFP. Survival analysis methods, including Cox proportional hazards regressions, Lifetable analysis, and Kaplan-Meier curves, assessed time to modern contraception uptake among women in both study arms. Understanding of return to fertility was investigated and LAM practices compared between groups by t-tests for proportion. Lastly, a new scale to measure contraceptive self-efficacy among the study population was developed and validated by psychometric analyses using data from the control arms in both countries.

Results

Qualitative findings revealed a process through which group care influenced PPFP, outlined by the following five themes: 1) Having enough time; 2) Engaging women in care; 3) Creating an environment where women feel “free”; 4) Equipping women with tools to facilitate discussions with their husband/partner; and 5) Continuing care through 12 months postpartum. Women in group care had higher rates of modern contraceptive uptake in the first 12 months postpartum compared to women in standard care, although this difference was insignificant. Significant differences were found between study arms in understanding of LAM requirements, and more LAM users in group care met these criteria. In

contraceptive self-efficacy scale development, three domains emerged: 1) husband/partner communication, 2) provider communication, and 3) choosing and managing a method. Scale score was associated with use of a modern contraceptive method at 12-months postpartum.

Conclusions

Results highlight *how* group care influences PPFP. Findings should inform PPFP policies and programs for women in low-and-middle income countries.

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LIST OF ACRONYMS

ANC	Antenatal care
AUC	Area under the curve
CHEW	Community Health Extension Worker
CHV	Community Health Volunteer
CPR	Contraceptive prevalence rate
cRCT	cluster Randomized Controlled Trial
CSE	Contraceptive self-efficacy
CSESSA	Contraceptive self-efficacy among women in sub-Saharan Africa
DMPA (IM/SC)	Depot Medroxyprogesterone Acetate (intramuscular/subcutaneous)
EC	Emergency contraception
FGD	Focus group discussion
FP	Family planning
FP2020	Family Planning 2020
FPR	False positive rate
GEE	Generalized estimating equations
ICC	Intracluster correlation
IDI	In-depth interview
IIC	Inter-item correlation
IUD	Intrauterine device
LAM	Lactational Amenorrhea Method
LMIC	Low-and-middle income countries
LTFU	Loss to follow-up
mCPR	Modern contraceptive prevalence rate
PCA	Principal components analysis
PNC	Postnatal care
RA	Research Assistant
ROC	Receiver operating characteristic
RTF	return to fertility
SBA	Skilled birth attendance
SSA	sub-Saharan Africa
TFR	Total fertility rate
WHO	World Health Organization
WRA	Woman of reproductive age (15-49)

Chapter 1. Introduction

Modern contraception is known to be one of the most cost-effective interventions for averting maternal and newborn deaths [1, 2]. Postpartum family planning (PPFP) uptake, or modern contraceptive initiation within the first year postpartum, encourages healthy birth spacing and is associated with improved outcomes for women and infants [3] [4]. In fact, if couples in low-and-middle income countries (LMIC) space pregnancies at least two years apart the risk of infant death and maternal morbidity significantly decrease [5]. Although few women in LMICs care to conceive during the postpartum period, PPFP rates remain low [3] [6]. When women's future fertility preferences and pregnancies resulting from contraceptive failure are considered, an estimated 39% of all unmet need for contraception in LMIC is attributed to women who have given birth in the previous 12 months [7].

Antenatal and postnatal care (ANC and PNC) are entry points for women to access health services during and after pregnancy and can facilitate a continuum of care for women and their children. In ANC and PNC, providers may initiate counseling on healthy timing and spacing of pregnancies through PPFP and address women's concerns about the side effects of various contraceptive methods. Evidence indicates that multiple high-intensity contraceptive counseling sessions during ANC and integration of PPFP into postpartum visits may substantially improve PPFP uptake [8] [9].

In practice, however, standard ANC and PNC (individual clinic appointments) often fall short of meeting the needs of women in LMIC and are a missed opportunity in regard to PPFP. Quality of services vary and in some settings contraceptive counseling is delayed until postpartum, at which point over half of women seek community-level or no care rather than facility-based services [10] [11] [12] [13]. Women who attend ANC and PNC often travel long distances and experience extended wait times for hurried interactions with a health care provider. In busy settings, providers often rush from client to client and may deliver sub-optimal care and inadequate contraceptive counseling [9] . This contributes to client dissatisfaction and reduced use of maternal health services [13] [14] . For providers, high caseloads,

human resource shortages, and lack of resources contribute to dissatisfaction and difficulty providing quality care [15].

One potential pathway to improve ANC and PNC for women in LMIC is through a group care model. In group care, women presenting for ANC are placed into cohorts with other women who are at similar stages of pregnancy. Women attend meetings at the health center as a cohort for the duration of pregnancy and the postpartum period. During group sessions, women receive the same standard of care provided during regular ANC. In addition, the group care model integrates participatory activities, sharing and learning from other women in the group, and an improved relationship with the health provider. This model of care allows for in-depth discussions on relevant topics, including family planning, at multiple time points during pregnancy and the postpartum period.

To date, the majority of research on group care has been done in high-income settings, although interest is growing for group care in low-resource contexts, as evidenced by recent studies assessing the feasibility and acceptability of this model across a range of LMIC settings [16] [17] [18] [19] [20] [21]. Several recent studies have found a significant association between group ANC and PPFP practice at 12 months postpartum in both high and low-resource settings [22] [23] [24] [25] [22]. There is a dearth of research exploring *how* this model of care may influence PPFP. It is hypothesized that group care may influence PPFP uptake and improve continuation rates by addressing women's concerns about contraceptive side-effects, improving understanding of PPFP, and increasing women's self-efficacy for practicing contraception [21]. This dissertation was designed to test this hypothesis by exploring how ANC and PNC service provision utilizing the group care model influences contraceptive behavior in the postpartum period in two LMIC. This study employed quantitative and qualitative methods using data from a cluster randomized control trial (cRCT) recently implemented to assess group as compared to standard ANC and PNC in Kenya and Nigeria.

Specific Aims

This dissertation is organized along the following aims:

Aim 1: To explore how group ANC and PNC: 1) influenced women's intention to use postpartum family planning and 2) addressed concerns about side effects of using various contraceptive methods.

Aim 2: To investigate time to modern contraceptive uptake (with and without lactational amenorrhea method [LAM]) between standard care compared to group ANC and PNC.

Aim2 a. To explore time to contraceptive uptake after key return to fertility (RTF) indicators (menses return and exclusive breastfeeding, separately) comparing study groups.

Aim 2b. To investigate understanding of LAM criteria, receipt of information on exclusive breastfeeding from a health provider, and actual LAM practices comparing study groups.

Aim 3: To validate a scale to measure contraceptive self-efficacy in this study population.

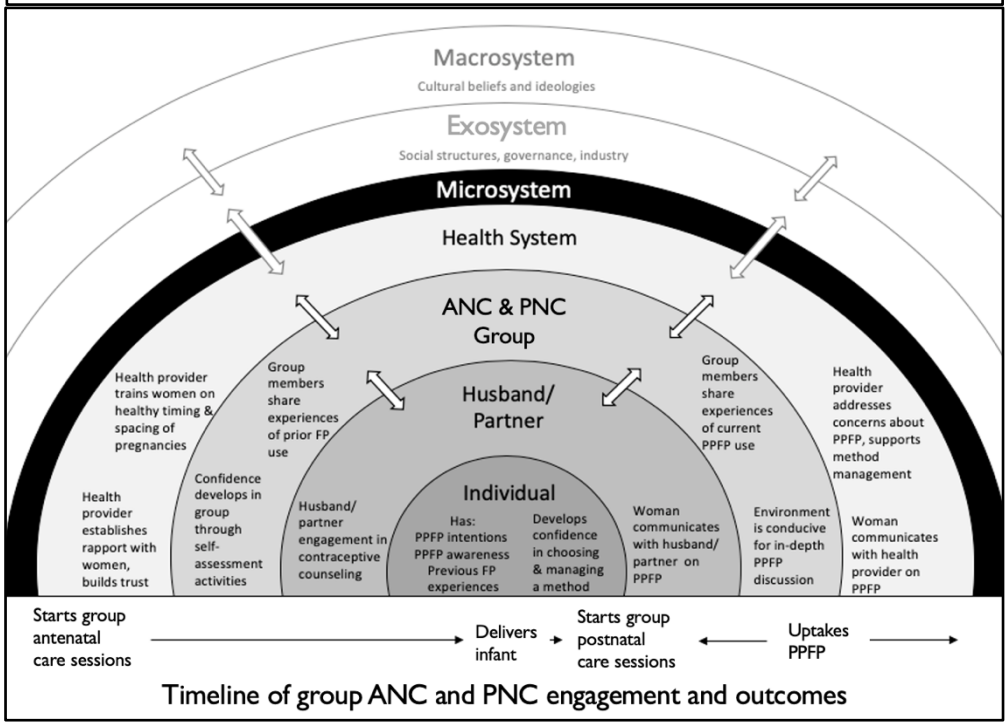
Findings from this study are relevant to ongoing efforts to improve postpartum contraceptive practices in LMIC settings. Researchers, policy makers, and programming staff may utilize the results to inform group-based family planning interventions and measurement of contraceptive self-efficacy.

Conceptual framework

Figure 1.1 depicts a conceptual framework to guide understanding of how group-based ANC and PNC may influence women's PPFP behaviors. This model is based in part on Bronfenbrenner's Ecological Framework for Human Development, which theorizes that individual's behaviors are influenced by the social context and environment in which they live [26]. Below the black arch, the model displays the microsystem of an ecological framework; women are situated in relation to their

husband/partner, ANC/PNC group, and the health system. This microsystem comprises the key family planning (FP) interactions and associated relationships that women have in their core environment, including actions that are considered necessary for developing contraceptive self-efficacy. These are presented according to their occurrence over the course of pregnancy and the first year postpartum, as depicted by the timeline below. As shown, the group care model presents multiple opportunities to foster understanding and communication as well as confidence in choosing and managing a PPFP method. These factors are expected to influence women's contraceptive self-efficacy for improved PPFP practice. The mesosystem connects the structures and relations in a woman's ecosystem (displayed as white arrows in the figure). Shown in light grey text are the exosystem, which represents the larger social structures in a society which a woman may not directly engage with, and the macrosystem, which encompasses the ideologies and attitudes of her culture [26].

Figure 1.1 Conceptual Framework: A social ecological model of how group care supports women's self-efficacy for postpartum contraceptive use over time



Dissertation overview

This dissertation is presented in seven chapters. Chapter one provides an overview of the dissertation topic, research aims, and conceptual model that guides the research. Chapter two presents background information relevant to the research, including reproductive health indicators and descriptions of the study sites. Chapter two also includes a literature review on postpartum family planning in Kenya and Nigeria, research on group care to date, and contraceptive self-efficacy measurement. Chapter three details the methods employed for data collection and analysis. Chapters four through six present independent publishable manuscripts of dissertation findings. Chapter four explores the processes through which group-based ANC and PNC may influence postpartum family planning, illustrated by qualitative findings from women and providers in Kenya and Nigeria (Aim 1). Chapter five investigates time to modern contraceptive uptake and understanding of postpartum fertility return among women in group versus standard ANC and PNC (Aim 2). Chapter six details development and validation of the scale to measure contraceptive self-efficacy among women in sub-Saharan Africa (Aim 3). This third paper is currently under review for publication in Contraception X. The prior two manuscripts (chapters four and five) will also be submitted for peer-reviewed publication. Finally, chapter seven presents a discussion of the strengths and limitations of this research as well as policy and program implications and trajectories for future research.

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Chapter 2. Background

Study Setting

This dissertation investigates the relationship between group ANC/PNC and PPFP in two countries with distinct reproductive health environments: Kenya and Nigeria. Key reproductive health indicators for both Kenya and Nigeria are provided in Table 2.1. Disparities in these statistics, particularly the total fertility rates (TFR) of 3.5 in Kenya versus 5.4 in Nigeria, demonstrate that Kenya is further along in the demographic transition than Nigeria [4] [7] [8]. Comparatively, greater proportions of women in Kenya seek facility-based health services during pregnancy and the first year postpartum. Modern contraceptive prevalence (mCPR) of women married or in a union is estimated at 62.3% in Kenya and 13.1% in Nigeria [6]. While recent growth in Kenya's mCPR reflects progress in expanding access and government investment in family planning, Nigeria's mCPR has remained relatively stagnant for the past two decades despite significant investments by both governmental and international non-governmental organizations. Postpartum CPR (any method used within 0-23 months) estimations of 36% in Kenya and 15% in Nigeria [5] indicate a need for improved family planning services and counseling to

Table 2.1 Key reproductive health indicators: Kenya and Nigeria

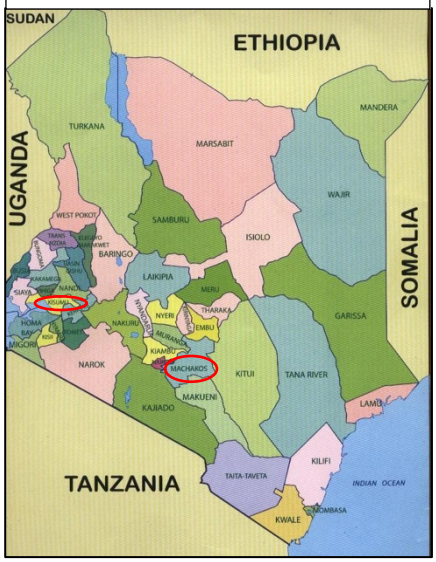
	Kenya	**Nigeria**
Maternal mortality ratio*	362	512
Neonatal mortality rate**	22	39
Total fertility rate	3.5	5.4
No ANC	4%	33%
Any ANC	96%	67%
At least 4 ANC visits	58%	57%
Median gestational age at first ANC	5.4 months	5.0 months
Birth with skilled provider	62%	43%
Birth in a facility	62%	39%
Postnatal care within 2 days (mother)	53%	42%
Postnatal care within 2 days (baby)	36%	38%
Exclusive breastfeeding	61%	29%
Modern Contraceptive Prevalence Rate (women married or in union)	62.3%	13.1%
Postpartum Contraceptive Prevalence***	36%	15%
Unmet need for modern contraception (all women)	12.5%	21%
Unmet need for contraception postpartum******	46%	61%

*Maternal mortality ratio is ratio of the number of maternal deaths per 100,000 live births
**Neonatal mortality rate is the number of neonatal deaths per 1000 live births
***Postpartum contraception is use of any contraceptive method within 0-23 months postpartum
****Unmet need for contraception measured postpartum at 24 months in Nigeria, 6 weeks in Kenya
Sources: **[1] [2] [3] [4] [5] [6]**

promote uptake in the first year postpartum. More detailed descriptions of study sites by country are provided below.

Kisumu and Machakos Counties, Kenya

Figure 2.1 Kisumu and Machakos Counties, Kenya



With a population of over 48 million people and a total fertility rate of 3.5, Kenya has made significant progress in reproductive health in recent years [9] [4]. Compared to women in Nigeria, women in Kenya are more likely to attend ANC during pregnancy, to deliver in a facility, and to practice exclusive breastfeeding [3] [2]. Kenya recently surpassed its Family Planning 2020 goal of 58% modern contraceptive prevalence (mCPR) among married women [6] The percent distribution of contraceptive users by method for Kenya overall and in the postpartum period are provided in Table 2.2; method mix break-down by county is not available. Study sites are highlighted in the map in Figure 2.1.

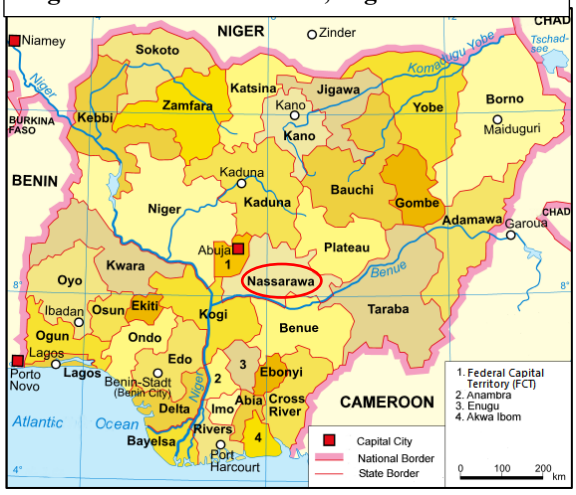
Kisumu is located in Western Kenya bordering Lake Victoria, and Machakos borders Nairobi. While Machakos is primarily an agricultural economy, Kisumu functions as a trading hub for Western Kenya. The TFR for Kisumu is 3.6 and in Machakos is 3.4 births per woman [3]. Predictors of PPFP uptake in Kenya include age, marital status, parity, fertility desires, previous family planning experiences, partner approval, support, and cohabitation, discussion of FP during ANC or PNC, and FP service provision at well-child or immunization visits [10] [11]. Integration of FP into maternal, newborn, and child health services varies by facility and is highest in areas where external support for integration exists, and in areas where women travel less than 30 minutes to reach a facility [12]. A recent study found that postpartum women in Kisumu and Machakos counties travelled an average of 7.1 kilometer from their home to a facility for contraceptive services [13].

Nasarawa State, Nigeria

Nigeria is the most populous nation in Africa, with an estimated total population of over 200 million [9]. Nigerian women give birth to an average of 5.4 children, and almost a quarter of births occur in less than two-year intervals [2] [4]. Facilitating factors associated with PPFP in Nigeria include education [14] [15] [16], urban residence [14] [17], religion [14], household wealth [18] [16], exposure to FP messaging [18] [14], and previous FP experience [18] [10]. In the postpartum period, 37% of women aiming to prevent pregnancy rely on traditional methods [19]. Condoms and injectables are the most common modern methods of PPFP across Nigeria, contributing to 20% and 16% of postpartum CPR respectively [1]. Of postpartum women using family planning, 22% report using the lactation amenorrhea method (LAM), although only 15% of postpartum women report the key LAM criteria of exclusive breastfeeding [1] [5].

Nasarawa State is a diverse, under-resourced state in the central region of Nigeria (see map in Figure 2.2). Although better off than more northern states, Nasarawa struggles to provide adequate resources for health including skilled providers, equal distribution of facilities, and sufficient health infrastructure [20]. These challenges are linked to low awareness and utilization of health services and issues in access to care [20]. Women in Nasarawa report lower levels of exposure to family planning messages from media sources compared to the average level of exposure across the country [2]. A recent study in Nasarawa State found common reasons for contraceptive non-use to include: lack of knowledge (23.6%), lack of interest (21.5%), perception of negative side effects (17.4%), and desire to become pregnant (18.1%) [20]. The distribution of contraceptive users by method in Nasarawa State varies slightly from that of the country overall, as

Figure 2.2 Nasarawa State, Nigeria



shown in Table 2.2. Notably, Nasarawa State has higher levels of implant and injectable practice and lower levels of traditional methods compared to Nigeria overall [19] [1].

Table 2.2 Percent distribution of contraceptive users by method type, Kenya and Nigeria*

	Sterili-zation	Implant	IUD	DMPA (IM)	DMPA (SC)	Pill	EC	Condom	Other modern	Other traditional
Kenya postpartum ***	1.7	16.9	3.4	64.0	-	10.2	-	3.4	1.7	-
Kenya overall	3.8	32.4	2.4	41.4	-	7.6	3.4	5.4	0.7	2.9
Nasarawa State	1.3	24.0	2.3	26.2	5.0	10.8	1.9	14.9	3.1	10.6
Nigeria postpartum **	-	2.0	2.0	16.0	-	12.0	-	20.0	2.0	37.0
Nigeria overall	1.6	9.9	3.5	13.2	1.9	11.5	4.4	22.7	1.6	29.7

IUD=Intrauterine device; DMPA= Depot Medroxyprogesterone Acetate; IM=intramuscular; SC=subcutaneous; EC=emergency contraception
*Denominator includes both married and unmarried women
**Nigeria postpartum method distribution measured at 24 months
***Kenya postpartum method distribution measured at 9 months, traditional methods excluded
Sources: [2] [19] [3] [21]

Literature review

Maternal health care utilization and contraceptive counseling in Kenya and Nigeria

Research shows that postpartum contraceptive initiation increases with maternal health service utilization, particularly ANC and PNC visits [14]. As noted in Table 2.1, utilization of key maternal and newborn health services, while moderate in Kenya, is low in Nigeria. These are national-level estimates; maternal health service utilization varies sub-nationally between rural and urban zones, education, and wealth and is actually declining in some states in Nigeria [22].

PNC, immunization, and pediatric visits are main points of facility-based care for postpartum women. The proportion of women receiving postpartum care increases with education and wealth [23].

Women in urban areas who deliver in a facility are more likely to receive postpartum care compared to women in rural areas who deliver in a facility [23]. The World Health Organization [24] recommends that women receive postnatal care within 48 hours, 1-2 weeks, and 6 weeks postpartum. Those who seek facility-based postpartum care typically do so at 6 weeks postpartum for their PNC visit, but nearly half (47%) of Kenyan women and over half (60%) of Nigerian women do not attend PNC after delivery [25] [26]. This is particularly problematic from the PPFP standpoint, as it is during this visit that contraceptive counseling generally takes place [25].

For women who do not seek facility-based care or who receive non-clinical postpartum care outside of the facility (for example, from Community Health Workers or Traditional Birth Attendants) contraceptive counseling may not occur [23]. In Kenya, Community Health Volunteers (CHVs) may conduct postnatal visits within 48 hours or 1-2 weeks after delivery, yet the standard care they provide has not been associated with family planning uptake and CHV motivation to provide services is often inhibited by lack of compensation [27] [28]. In Nigeria, the Nasarawa State Government recently began operationalizing a Tasksharing and Taskshifting Policy to allow Community Health Extension Workers (CHEWs) to provide family planning counseling and methods, including implants, at the community level alongside other maternal and newborn health services [29]. In other settings, CHEW programs that integrated PPFP into maternal and newborn health services have contributed to vast improvements in PPFP uptake [30] [31]. It is yet to be seen if the Tasksharing and Taskshifting Policy will have such an effect in Nasarawa State.

Research indicates that current contraceptive counseling practices in LMIC fail to influence women to move past intention for PPFP to actual use [15]. Standard provision of contraceptive counselling at 6 weeks postpartum is not sufficient [25] [32]. This is due, in part, to competing priorities and time constraints faced by providers who must rush from patient to patient in busy facilities [25]. The typical client-provider interaction in this setting does not allow for in-depth discussion of contraceptive methods, their side-effects, or clarifying points to address women's concerns about PPFP [33].

Several approaches have been introduced to improve contraceptive counseling in LMIC. For example, there is evidence that intensive counseling at multiple ANC visits is more effective at generating demand for PPFP [25]. Other recent studies have found antenatal counseling to be associated with expressed intention for PPFP and increased contraceptive practice [25] [15] [34]. For women who deliver in a facility, a 20-minute pre-discharge contraceptive counseling session may be effective, particularly among women who are likely to return to sex before the 6-week postnatal visit [32]. In Kenya, pre-discharge contraceptive counseling with an option for immediate PPFP insertion is gaining traction and is the subject of several recent and ongoing studies [35] [36]. Family planning messaging at routine postpartum visits such as child immunizations and the 6-week PNC appointment have also been shown to influence PPFP [33] [11].

Yet, gaps remain. In a recent study in western Kenya, only 15% of women who attended ANC were counseled on PPFP [10]. A study in Ogun State, Nigeria, found that two-thirds of women surveyed reported being unhappy about their involvement in decision-making regarding postpartum contraception [33]. Of these women, 9.1% reported that they would have liked to receive more information on PPFP and 7.3% of women reported that they received no information on PPFP [33].

The group care intervention investigated by this dissertation targeted PPFP through multiple contraceptive counseling sessions both pre and postpartum which incorporated in-depth conversations on PPFP among group members and their families.

Measurements and determinants of PPFP

Postpartum contraceptive prevalence (women practicing any method within 0-23 months after delivery) is estimated at 36% in Kenya and 15% in Nigeria [5]. Unmet need for contraception within the first 24 months postpartum is high in both settings, at 57% in Kenya and 65% in Nigeria [5]. This estimate may not accurately represent unmet need for the entire postpartum period, as we know that unmet need rises between 6-12 and 12-23 months postpartum before declining [37]. Calculating the

unmet need for family planning in the postpartum period is somewhat complicated. Non-contraceptive users who are pregnant or postpartum amenorrhoeic (whose period has not returned since last live birth within the last two years) are considered to have unmet need for limiting pregnancy if their current pregnancy or last live birth was *not at all* wanted. Pregnant or postpartum amenorrhoeic women who wanted their current pregnancy or last live birth *later* are considered to have an unmet need for spacing. Pregnant or postpartum amenorrhoeic women who wanted their current pregnancy or last live birth are considered to have no unmet need for family planning regardless of their feelings toward future pregnancy. The current DHS calculation does not account for current or last pregnancy resulting from contraceptive failure [38].

It is critical to consider why postpartum women who prefer to limit or space childbearing are not using PPFP. One recent study in Nigeria found that reasons for non-use of contraceptives among amenorrhoeic, sexually active women 0-23 months postpartum who said they did not want another child in the next two years include: opposition to modern contraception (39%), lack of access/knowledge (21%), breastfeeding (18%), health concerns/side effects (9%), infrequent sex (2%), and amenorrhea (1%) [37]. A survey of women 6-weeks postpartum at a Lagos Teaching Hospital in Nigeria found that women were dissuaded from PPFP due to desire for more children, religion, previous negative experience with contraception, husband's objection, or friend's/colleague's objection [15]. Complicating matters is a low perceived risk of pregnancy among postpartum women, pregnancy ambivalence, and poor understanding of return to fertility among both women and providers [39] [37]. There is currently a dearth of research on women's understanding of postpartum fertility return. Yet, evidence demonstrates that women often resume sexual activity before initiating contraception [40] [41].

The postpartum period is considered to be a time of vulnerability for both mothers and infants, and the perception that contraceptives may be harmful to a mother or infant discourages PPFP. Furthermore, there is widespread reliance on return of menses as an indicator for contraceptive initiation [37]. Many women wait for the return of menses before starting a PPFP method [42] [43]. Providers may

confuse women and delay contraceptive initiation by insisting on menstruation as evidence of non-pregnancy prior to offering family planning methods to postpartum women [37]. There is also widespread misunderstanding of LAM as a method of contraception. Research shows that in LMIC only 26% of women who report using LAM actually meet the criteria for effective use, meaning that they are not exclusively breastfeeding or that they have reported using LAM after menses return or after 6 months postpartum when it is no longer an effective method [44]. Researchers estimate that such misunderstandings contribute to approximately 1.5 million women across 45 LMIC incorrectly believing that they are using an effective contraceptive method when they are not [44].

Group care as an alternative model of service provision to improve PPFP

Theoretical basis for group medical interventions

Facilitated group discussions, a pillar of the group care model, are known to promote motivation and deeper understanding among adult learners by incorporating social interaction and recognizing the value of past experiences in knowledge construction [45] [46]. Vygotsky and Knowles' theories on adult learning provide insight as to why facilitated group discussions may be effective for learning about contraception during group ANC and PNC [46]. Vygotsky's cognitive and social development theory emphasizes that communication and social interaction are necessary elements to learning [46]. Knowles' theory on andragogy (adult learning) specifies that adult learners are self-directed, internally motivated, have previous experience to draw from, and seek practical learning [47]. As described below, the group care model aligns with these theories while also incorporating processes that promote reflection and collaborative learning [48]. In short, group care provides a preferable environment for adult learning that is distinctive from individual care [45] [49].

Service delivery model & evidence to date

The group care model may improve ANC and PNC for women in LMIC. The WHO currently recommends research on group care as a health system intervention which may improve utilization and

quality of care; group care may also improve PPFP uptake [24]. In a group care setting, 8-15 women with pregnancies of similar gestational age engage in interactive ANC and postpartum meetings facilitated by a skilled provider. These meetings combine typical clinical assessments by a skilled provider with women's self-assessments (measurement of blood pressure and weight, responding to questions on current state); assessment activities are then followed by a facilitated discussion on a topic of interest specific to the women's stage of pregnancy. With group care, family planning discussions can occur at multiple time points during pregnancy and the postpartum period. Caring for several women at once allows providers to deliver comprehensive care and counseling through discussion and participatory activities. Each meeting occurs on a schedule and lasts between 1-2 hours, resulting in a more efficient use of time for both providers and clients.

Group ANC and PNC models have primarily been studied and implemented among marginalized women in high-income countries [50], although the evidence base is growing for utility of this model in LMIC [51] [52] [53] [54]. A 2018 systematic review identified 9 LMIC group ANC programs in the published literature and 10 ongoing group care interventions aimed at exploring the feasibility and acceptability of this model in various LMIC settings [55]. Recent studies in Ghana and Northern Nigeria found group ANC associated with improved ANC utilization and facility-based delivery [56] [57]. Qualitative findings from Nepal indicate that women in group ANC gained confidence to discuss health in a group and learned from other women during discussions, while providers noted a positive effect of group care on PPFP [58]. Similarly, findings from the East Africa Preterm Birth Initiative's group care study in Rwanda point to improved relationships between women and providers in this care model [59]. Several published studies identify a significant association between group care and postpartum family planning uptake, although the mechanisms behind this association are unclear [60] [61] [62] [63]. No studies to date investigate *how* group care may influence PPFP behavior in LMIC, although there is growing interest in this phenomenon as group models become more prevalent.

Gaps in knowledge

It is unclear what components of group care influence contraceptive behavior in the postpartum period, and whether the same results found to date might transfer to other settings [60] [61] [62] [63] [60]. It is hypothesized that group antenatal and postnatal care may influence PPFP behavior by: improving communication and understanding, addressing women's concerns about contraceptive side-effects, and increasing women's self-efficacy for contraception [51]. This dissertation tests this hypothesis. Furthermore, as no appropriate measurement tool existed for measuring contraceptive self-efficacy in sub Saharan Africa (SSA) prior to this study, Chapter 6 details the development and validation of a new scale for this construct.

Contraceptive self-efficacy measurement

Contraceptive self-efficacy (CSE) is a woman's belief in her own ability to succeed in contraceptive initiation, management, and continued use. This definition is based on social cognitive theorist Albert Bandura's work, which defined self-efficacy as "the belief in one's capabilities to organize and execute the sources of action required to manage prospective situations" [64]. Theories of self-efficacy link an individual's beliefs about their personal capabilities to their health behaviors, and evidence indicates that practices that promote self-efficacy influence behavior change [64]. There is no catch-all measure for self-efficacy because one person can have different levels of self-efficacy for different behaviors.

In the literature, CSE is recognized as a precursor to effective contraceptive uptake [65] [66] [67] [68]. However, most efforts to measure contraceptive-related self-efficacy have been restricted to adolescents in high-resource settings. There are validated scales to measure self-efficacy for condom use, self-efficacy for sexual communication, and self-efficacy related to protective sexual behaviors [69] [70] [71] [72].

A CSE scale was developed by Levinson in 1998 to measure this concept among adolescents in high income-settings. Levinson's scale has been validated in a variety of settings across the US, Canada,

and Mexico [65] [66]. However, most items in Levinson's scale are not relevant to non-adolescent women in SSA. Peyman's 2009 study in Iran included measures of perceived self-efficacy for family planning alongside measures of general self-efficacy [67]. Only five items in Peyman's scale relate to family planning, and the measure has not been validated [67]. Prior to this dissertation research, there was no appropriate standardized tool to measure CSE in SSA. The validated measure presented in Chapter 6 of this dissertation, the scale to measure contraceptive self-efficacy in sub-Saharan Africa (CSESSA), was developed to provide insight to the mechanisms behind group care and other family planning interventions in SSA.

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Chapter 3. Methods

Data source and study design

Data for this dissertation are from a cRCT implemented by Jhpiego to assess group as compared to standard ANC and PNC in Kisumu and Machakos Counties, Kenya, and Nasarawa State, Nigeria. This cRCT is hereafter referred to as the parent study. The present dissertation research included secondary analysis of quantitative data and primary analysis of qualitative data from the parent study. The parent study occurred from January 2017 through July 2018; details of the study protocol have been published in Kabue et al 2018 and Grenier et al 2019 [1] [2]. A brief description of the intervention and explanations of the sampling frame and data collection activities are included in the ensuing pages, followed by an overview of the analytical methods employed for each research aim. More in-depth information is provided in Chapters 4-6, within the Methods section of each individual paper.

In short, randomization occurred at the health facility level. Women presenting for their first ANC visit at intervention facilities during the study period were offered enrollment in group care, while control facilities continued to provide the standard of care (i.e, individual clinic appointments for ANC and postpartum visits). Intervention implementation occurred in two phases: ANC enrollment through 3-6 weeks postpartum (Phase I) and from 3-6 weeks through 12 months postpartum (Phase II). Study participants were enrolled at their first ANC visit and followed prospectively.

Intervention: Group-based ANC and PNC

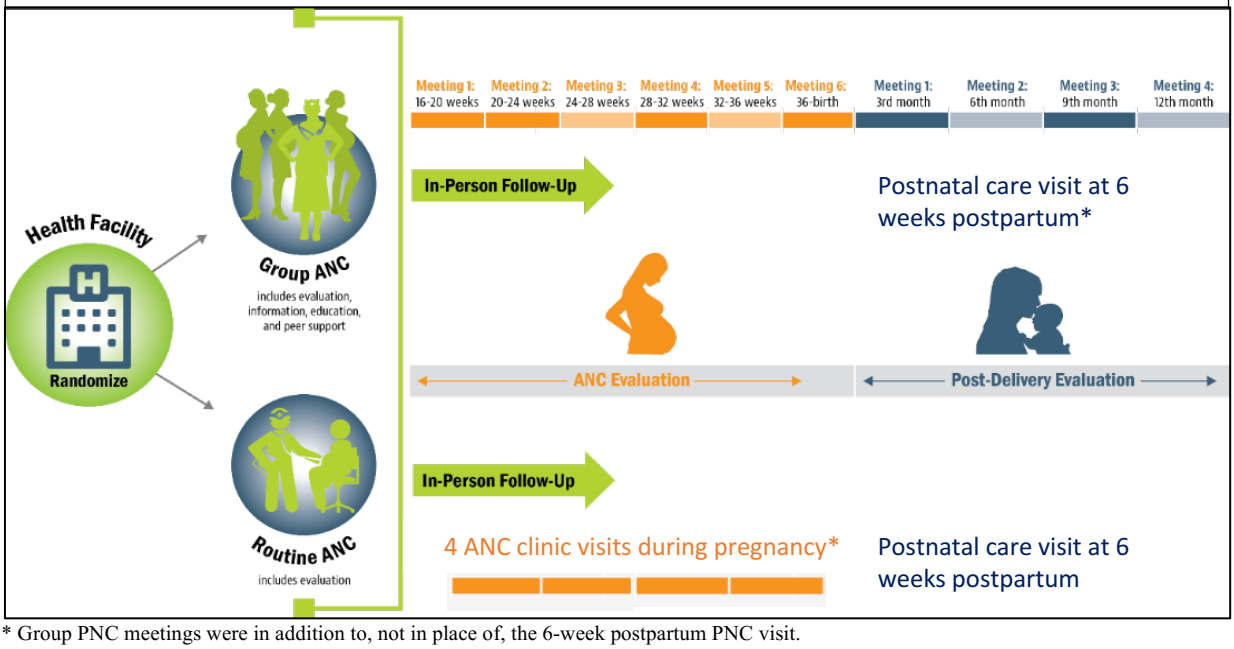
Study facilities were randomized to provide either group-based or standard ANC and PNC. At intervention facilities, group meetings were scheduled on a fixed day/time and group membership was static such that the same women and facilitators attended each group meeting. Each group was run in a designated space by two trained facilitators, at least one of whom was a skilled provider.

Each meeting had the same general structure:

1. Self-assessment/co-assessment by the clients themselves and initially taught and supervised by the skilled provider (such as weight and blood pressure using an automated cuff and urinalysis using dipsticks)
2. Discussion around pre-determined themes using materials designed for group care
3. Individual assessments by the provider in a private space
4. Time for mutual support and social cohesion of the group.

Each meeting lasted about two hours and was documented as an ANC visit during pregnancy. Women had the opportunity for private time with the provider on the same day of the group meeting if desired or needed for health and/or safety. Women were told that they should return at any other non-group time if they had questions or concerns. A total of 10 meetings were conducted for each group: six group ANC meetings (in addition to the first ANC intake during which women were recruited); and four PNC meetings with women and their infants in the year following birth (see Figure 3.1 for study timeline).

Figure 3.1 Timeline for cluster randomized control trial comparing standard to group based antenatal and postnatal care



* Group PNC meetings were in addition to, not in place of, the 6-week postpartum PNC visit.
**At the time of study design, The WHO recommended at least four antenatal care visits during pregnancy to promote perinatal health. The WHO has since introduced the 2016 WHO ANC Model, which recommends at least eight points of contact during pregnancy.

The clinical content of ANC was the same for both study arms, delivered according to the local Ministry of Health guidelines. Likewise, meeting topics covered, at a minimum, all counseling and educational topics included in national guidelines. For the intervention group, PPFP was discussed at length during meetings 3, 4 and 5 of group ANC as well as during the PNC sessions. Husbands/partners were invited to participate in PPFP discussions during the 3rd group ANC meeting. The four group PNC meetings during the first year postpartum were not intended to provide or replace postnatal visits. Where timing matched, providers incorporated the clinical care normally given, such as infant immunizations and growth monitoring. However, rather than a replacement of standard care (such as for ANC), group PNC sessions provided additional, non-standard points of care (at approximately 3, 6, 9, and 12 months). The PNC groups were intended to provide women with ongoing peer support. PNC group sessions focused on normal infant growth and development, appropriate feeding practices, and PPFP.

Sampling Design

Participating health facilities were selected from two counties in Kenya (Kisumu and Machakos), and one state in Nigeria (Nasarawa). The levels of skilled birth attendance (SBA) are 69% in Kisumu, 63% in Machakos, and 40% in Nasarawa [3] [4]. As SBA rates vary within each county, sub-counties were selected that had an SBA rate near 50%. From the sub-counties, health facilities were selected if they met the following eligibility criteria: enrollment of a minimum of 20 new ANC clients <24 weeks gestational age per month; had CHEWs or community health volunteers available, assigned, and working in the health facility; had a minimum of two staff during all working hours; had on-site availability of ANC, postnatal visits, and modern contraceptive services; and permission granted by the health facility management. Selected facilities within counties were then matched in pairs in order of priority as follows: 1. Location (urban; peri-urban; rural); 2. Level of facility; 3. Volume of ANC clients; 4. Culturally similar catchment populations; 5. Family planning method availability and PPFP uptake. Within each pair, facilities were randomized to control or intervention using simple random sampling at a ratio of 1:1.

Data collection

Human subjects research

This human subjects research study was reviewed and approved by the Johns Hopkins Bloomberg School of Public Health Institutional Review Board, the Kenya Medical Research Institute Ethics Review Committee, and the National Human Research Ethics Committee of Nigeria. Health care workers at facilities meeting the inclusion criteria were approached and informed of the study, including non-blind randomization procedures and the provider's role in screening first-time ANC clients for eligibility to participate. Providers at intervention facilities were informed that they would be asked to complete three surveys during the study and may be invited to participate in up to two focus group discussions or in-depth interviews to share their experience providing group care. Written informed consent was obtained from health providers by study staff.

Consented health providers screened potential participants for eligibility at the end of their first ANC visit (see Table 3.1 for eligibility criteria). Potential participants who were deemed eligible were then consented by study staff. Potential participants were informed of the nature of the study and the follow-up time points at which they would be contacted (by phone and in-person) for data collection activities. Women at the intervention facilities who declined to consent were referred to standard care. Women who agreed to participate in group care were assigned to a group that met for the first time when the women were 16-24 weeks pregnant. Group enrollment occurred on a rolling basis until a maximum of 15 women were assigned to each group.

Table 3.1 Eligibility criteria for health care workers and pregnant women

Health care workers	Inclusion criteria	• Working in a participating/selected health facility and providing ANC or PNC services • Willing to participate in the study

Pregnant women (participants)	Inclusion criteria	• Minimum age of 15 years at the time of enrollment (those aged 15–17 years were treated as emancipated/ mature minors in Kenya) • Gestational age between 16–20 weeks at the time of first group meeting determined by last menstrual period, pelvic exam, fundal height, quickening, ultrasound, and/or timing of fetal heart tones and pregnancy test • Pregnant women able and willing to provide adequate locator information • Planning to reside at their current location for at least 18 months • Willing to participate and consent to follow up for up to 12 months post-delivery
	Exclusion criteria	• Women who plan to travel away from the study site for more than four consecutive weeks during antenatal care and 12 consecutive weeks during postnatal care • Women who are unable to provide consent • Women who have any condition that in the opinion of the investigator or designee, would complicate interpretation of study outcome data, make participation in the study unsafe, or otherwise interfere with achieving the study objectives

Qualitative Data

Aim 1 utilized qualitative data collected at the end of study Phases I & II. Data were gathered through focus group discussions (FGDs) and in-depth interviews (IDIs) of women participating in group care as well as FGDs and IDIs of intervention facility providers. A total of 11 FGDs and 19 IDIs with 145 group care participants (76 from Kenya and 69 from Nigeria) and 4 FGDs and 4 IDIs with 45 intervention facility providers (22 from Kenya and 23 from Nigeria) were conducted at the end of Phase I. At the end of Phase II, 11 FGDs and 15 IDIs took place with 118 participants (75 from Kenya and 43 from Nigeria) while 3 FGDs and 2 IDIs were done with 30 providers (21 in Kenya, 9 in Nigeria). All FGDs and IDIs were facilitated by local research assistants and lasted between 60-90 minutes. Each IDI and FGD was audio-recorded, transcribed, and translated into English by local staff.

The purpose of these data collection activities was to gain insight on the experiences of group care participants (both women and providers) to inform future group ANC and PNC service provision, and to understand how the intervention differed from standard care. Separate FGDs were conducted with providers and participants. Semi-structured FGD and IDI guides were used to facilitate qualitative data collection activities. Among other topics, prompts related to family planning were included in the guides for both women and health care providers. Women who participated in group care were asked about their family planning intentions before, during, and after the group sessions and whether discussions in the

group care setting influenced their thinking on contraceptive use. They were also asked about concerns they may have had related to contraceptive methods and how (if at all) these were addressed in the group setting. IDIs were conducted among select women to gather additional information on experiences related to childbirth or postpartum contraceptive use. Providers were asked to describe and compare their experiences in counseling patients on contraceptive options and use in and out of the group care setting.

This dissertation analyzed qualitative data from both participant types to explore how group ANC and PNC experiences: 1) influenced women's intention to use postpartum family planning, and 2) addressed concerns about side effects of using various contraceptive methods in the postpartum period. While participants were expected to provide first-hand accounts of their group care experience, providers offered insight and observations to help understand what women found important in group ANC and PNC.

Quantitative Data

Aims 2 and 3 utilized quantitative data collected from women in the 12-month postpartum survey, administered at the end of Phase II. In Kenya, 1,017 women enrolled (505 into the intervention and 508 into the control group). Of these, 415 women in the intervention and 411 in the control group were surveyed at 6 weeks postpartum; the 12-month postpartum survey was administered to 316 women in the intervention and 315 in the control group. The overall attrition rate from enrollment to the end of Phase 2 in Kenya was high, at 37.7% (382/1,013 women) but did not differ between study arms.

In Nigeria, 1,075 women were consented into the study (535 in the intervention, 540 in the control group). Of these, 510 women in the intervention and 508 in the control group were surveyed at 6 weeks postpartum; 439 women in the intervention and 434 in the control group completed the 12-month postpartum survey. The overall attrition rate from enrollment to the end of Phase II in Nigeria was 18.8% (202/1075 women). This loss to follow-up did not vary between study arms.

All quantitative data were collected via structured questionnaires administered at facilities (at enrollment) or in participant homes (at 12 months postpartum) by Research Assistants using *RedCap*

mobile technology to upload data remotely to a secure cloud-based server. Domains of inquiry specific to the present research include socioeconomic characteristics, uptake of PPFP, method selection, contraceptive behavior in the first 12 months postpartum, knowledge of LAM, receipt of information about breastfeeding from a health care provider, and contraceptive self-efficacy.

Analysis

Aim 1: To explore how group ANC and PNC experiences: 1) influenced women's intention to use postpartum family planning and 2) addressed concerns about side effects of using various contraceptive methods.

Qualitative data, in the form of transcripts, were uploaded to Atlas.ti software for inductive content analysis. Content analysis is a systematic research method used to organize, condense, and extract meaning from qualitative data using an iterative process of coding and categorizing words and phrases in order to gain enhanced understanding of underlying phenomena [5]. An inductive approach was used to draw meaning from the data using open coding followed by code grouping, categorization of code groups, and thematic abstraction. In abstraction, the developed code structures were mapped to highlight emergent themes from the data ([5]).

Several steps were taken to ensure that this analysis met the quality criteria for trustworthiness in qualitative research [6]. Credibility was established by collecting qualitative data at two time points: after ANC and PNC separately, and by triangulating the sources of data to obtain perspectives of both women and providers. The research path was recorded, and analysis triangulated among the study team, contributing to the dependability and confirmability of findings. Descriptions of the context of standard and group-based care are meant to inform transferability to similar LMIC settings [6]. Findings from this analysis are presented in Chapter 4.

Aim 2: To investigate time to modern contraceptive uptake (with and without lactational amenorrhea method [LAM]) between control and intervention groups.

Time to modern contraceptive uptake (including and excluding LAM) was investigated by survival analysis methods. Participants were considered at risk of taking up contraception starting from time 0 (t_0, their infant's birthdate or 0 months postpartum) and through 12 months postpartum (t_{12}, their infant's first birthday). Time was measured by month according to the infant's age, and contraceptive behaviors were recorded based on women's recall at the time of the 12-month postpartum (Phase II) survey. Observations for participants who did not begin using a method of contraception by 12 months postpartum were right-censored. Since the 12-month data were collected by recall at one data collection time point there was no censoring due to loss to follow-up or a participant withdrawn from the study. Since participants were not eligible for contraceptive uptake prior to t_0 due to pregnancy and not all participants practiced contraception by 12 months postpartum, there was no truncation in the data. The syntax of survival analysis in this study was counter-intuitive; modern contraceptive uptake was considered a "failure" event, while "survival" indicated non-use of modern contraception.

Cox proportional hazards regression was carried out to assess the association between intervention status and time to modern contraceptive uptake. Two models were used, one including and one excluding LAM as a modern method. Post-estimation assessment was done to check the proportional-hazards assumption based on Schoenfeld residuals, in which residuals were plotted against time as a test for non-zero slope [7]. The model including LAM as a modern method failed to meet the proportional-hazards assumption, and thus LAM was not included as a modern method in the remaining survival analyses.

The Cox proportional hazards regression model was specified as follows:

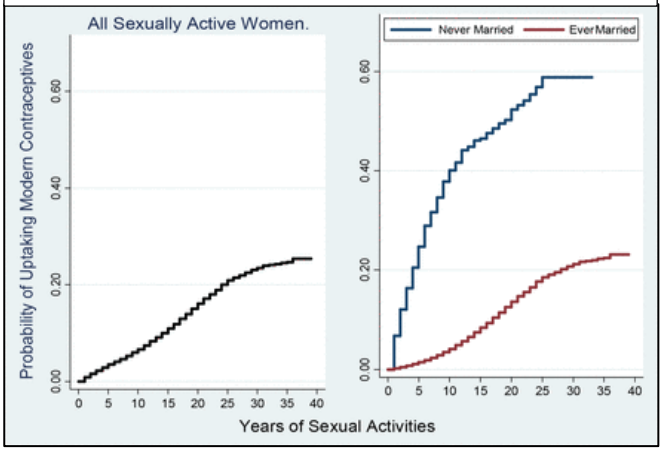
$$h(t|x_1x_2\ldots x_k) = h_0(t)\exp(\beta_1x_1 + \beta_2x_2 + \cdots + \beta_kx_k)$$

where the hazard rate $h(t|x_1x_2\ldots x_k)$ is equal to the baseline hazard function $h_0(t)$ multiplied by the relative hazard $\exp(\beta_1x_1 + \beta_2x_2 + \cdots + \beta_kx_k)$ [7]. Due to the randomized design of the parent study,

it was not necessary to adjust for sociodemographic covariates in this analysis. The Cox proportional hazards regression adjusted for health facility as the shared frailty parameter and utilized the Efron method to treat tied failures. Lifetable analyses were performed to reveal descriptive statistics including median time to uptake, time at risk, and failure rate (rate of uptake) in the first 12 months postpartum. Results are presented as descriptive statistics and hazard ratios in Chapter 5.

Kaplan-Meier estimators were calculated and graphically displayed to show the differences in probability of failure (ie: use of a modern contraceptive) at each month postpartum, up to 12 months. Findings are presented as Kaplan-Meier Curves in Chapter 5 (see Figure 3.2 below for example [8]).

Figure 3.2 Example Kaplan Meier Curve



The Kaplan-Meier estimator, also known as the product limit estimate of the survivor function, is a non-parametric estimate of the survivor function (which provides the probability of surviving past time *t*) [7].

The Kaplan-Meier estimate at any time *t* is calculated as:

$$\hat{S}(t) = \prod_{j|t_j \leq t} \frac{n_j - d_j}{n_j}$$

Where:

n_j is the number of individuals at risk (ie: not using modern contraception) at time t_j

d_j is the number of failures (ie: modern contraceptive uptake) at time t_j, and

the product is over all observed failure times less than or equal to time *t*.

With the Kaplan-Meier estimator, probabilities of contraceptive uptake (failure) can be calculated and compared by treatment group. This is obtained via the cumulative distribution function, which is 1 minus the Kaplan-Meier estimate [7]:

$$F(t) = 1 - \hat{S}(t)$$

Aim2 a. To explore time to contraceptive uptake after key return to fertility (RTF) indicators (menses return and exclusive breastfeeding, separately) comparing study groups.

Lifetable analyses and Cox proportional hazards regressions were repeated (using the specifications described above) to assess time to modern contraceptive uptake, excluding LAM, after key RTF indicators, comparing study arms. Rather than utilizing birth as t_0, Aim2a analyses considered participants to be at risk of taking up contraception starting from the month of their RTF event (the month when menses returned or the month when breastfeeding ceased, assessed separately) through 12 months postpartum. Results are presented as descriptive statistics and hazards ratios in Chapter 5.

Aim 2b. To investigate understanding of LAM criteria, receipt of information on exclusive breastfeeding from a health provider, and actual LAM practices comparing study groups.

Aim2b analyses employed t-tests for proportion that were adjusted for clustering of the data at the health facility level. During the Phase II survey, a vignette of a woman named Habiba was utilized to evaluate women's knowledge of LAM criteria. Participants were told "Habiba's baby is 2 months old. She does not want to get pregnant again yet. She would like to use a method called lactational amenorrhea method, or LAM, to prevent another pregnancy." A series of questions followed that related to factors that might affect Habiba's risk of pregnancy, to assess participant understanding of the requirements of effective LAM practice. T-tests (adjusted for clustering in the data) evaluated the significance of differences in proportions of women in each study arm who correctly identified factors influencing LAM efficacy. Differences in women's report of receiving information on breastfeeding from a health provider in the first 12 months postpartum were also examined by t-test for proportions, comparing study arms, adjusted for clustering. Cluster-adjusted t-tests for proportion also assessed adherence to LAM criteria by intervention status and, among women who reported LAM practice, transition to another method within the first 12 months postpartum.

Aim 3: To validate a scale to measure contraceptive self-efficacy in this study population.

Aim 3 utilized quantitative data collected as part of the Phase II survey. The 18 item CSESSA scale was administered in this survey to women in both control and intervention groups; however, this dissertation analysis was restricted to data from participants in the control groups for both settings, to rule out any influence of group care on women's contraceptive self-efficacy.

The multi-dimensional scale included 18 items related to husband/partner communication, provider communication, and choosing and managing a method. Prior to validation, reliability was assessed to determine internal consistency of the full scale with both the Kenya and Nigeria data. Reliability was measured by means of the Cronbach's alpha statistic, which provides the proportion of total variation in responses attributable to actual variation in the latent variable (CSE) rather than error.

Cronbach's alpha was calculated by:

$$\alpha = \frac{\kappa \bar{c}}{\bar{v} + (\kappa - 1)\bar{c}}$$

Where:

κ is the number of scale items

$\bar{c}$ is the average of all covariances between items, and

$\bar{v}$ is the average variance of each item

A Cronbach's alpha value between 0.65-0.95 was considered indication of a reliable measure. If the alpha was above 0.95, scale items were checked for redundancy, and the scale was shortened if there was high correlation between items.

To assess the adequacy of the CSESSA scale to measure CSE in this population, criterion-related (predictive) and construct validity were examined.

Criterion-related validity represents the empirical association between the scale and an external criterion, often referred to as the "gold standard" [9]. Criterion-related validity was explored via the area under the curve (AUC) of a receiver operating characteristic [10] curve. The AUC, a summary measure of diagnostic performance ranging from 0 to 1, provides the average sensitivity value for all possible specificity values (Figure 3.3). As the AUC approaches 1, the diagnostic performance of a test improves [11]. In this dissertation, the AUC was calculated for a ROC to assess the predictive capability of the total CSESSA score against current modern contraceptive use. In Figure 3.3 [55], "A" represents a perfect predictive test, with an AUC value of 1.

The diagonal line "D" represents an AUC of 0.5. Curves "B" and "C" fall in-between these values. In this study, criterion-related validity was considered to be established if the AUC was greater than 0.60 when assessing the total CSESSA scale score as a potential predictor of current modern contraceptive use.

Figure 3.3 ROC curve with hypothetical AUC values

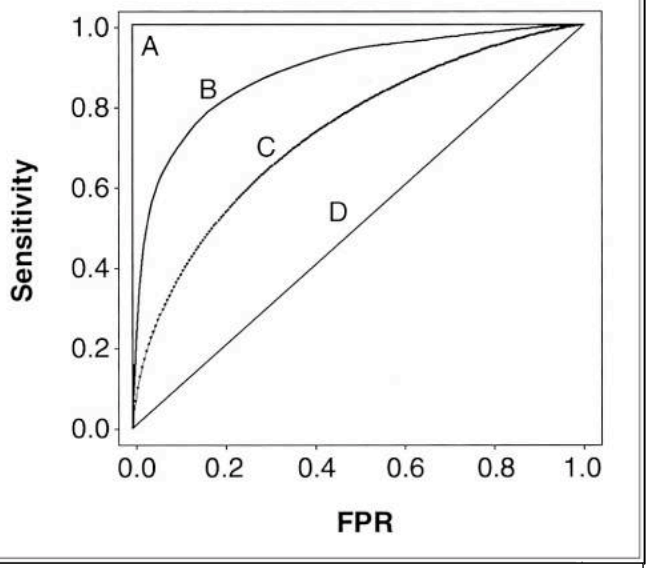


Figure 9 displays four ROC curves with differing AUC values. Test sensitivity lies on the y-axis, while the false positive rate (FPR, or 1-specificity) lies on the x-axis.

Construct validity is the extent to which a measure performs as one would anticipate in relation to established measures of other related constructs [9]. To assess construct validity of the CSESSA scale, the relationship of the total CSESSA score (grouped in quartiles) to current modern contraceptive use was examined by running a Generalized Estimating Equation (GEE). GEE regression extends the generalized linear model to accommodate correlated observations, which was appropriate given clustering of data at the health facility level in this dataset [12]. The response variable in the GEE analysis was women's reported current modern contraceptive use, a binary outcome. The total CSESSA score (quartiles from lowest-highest total score) was included as a covariate. The model was specified as having a logit link, binomial distribution, and exchangeable correlation structure.

$$ln\left(\frac{modern\ contraceptive\ use}{no\ modern\ contraceptive\ use}\right)$$
$$= \beta_0 + \beta_1(lowest\ CSESSA\ score) + \beta_2(low\ CSESSA\ score)$$
$$+ \beta_3(medium\ CSESSA\ score) + \beta_4(high\ CSESSA\ score)$$
$$+ \beta_5(highest\ CSESSA\ score) + CORR + Error$$

Findings from Aim 3 analyses are presented in Chapter 6, and include the Cronbach's alpha reliability measure, the ROC curve and associated AUC measure, and the odds ratio resulting from the GEE analysis.

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Chapter 4. (Paper 1) How does group-based antenatal and postnatal care influence postpartum family planning? A qualitative study exploring the experiences of women and providers in Kenya and Nigeria

Abstract

Background

Postpartum family planning (PPFP), or contraceptive adoption within 12 months postpartum, improves outcomes for women and infants by preventing short birth intervals. Yet, in low-middle income countries, PPFP rates remain low. This paper explores women and providers' experiences with facilitated group discussion on PPFP during facility-based group antenatal and postnatal care (ANC, PNC) in Kenya and Nigeria.

Methods

We conducted a qualitative evaluation within a cluster-randomized control trial comparing group versus individual ANC and PNC. We conducted focus group discussions (29) and in-depth interviews (38) with participating women and group care providers at 6 weeks and 12 months postpartum. We employed inductive content analysis and thematic abstraction to draw meaning from the data using Atlas.ti software.

Results

Five themes summarize how group care influences PPFP uptake: 1) Having enough time; 2) Engaging women in care; 3) Creating an environment where women feel "free"; 4) Equipping women with tools to facilitate discussions with their husband/partner; and 5) Continuing care through 12 months postpartum. Women reported increased knowledge of PPFP methods and side-effects. They attributed confidence in

decision-making and PPFP uptake to group care. Providers gained confidence in discussing contraception with patients.

Conclusions

Group-based ANC and PNC influences postpartum contraceptive behaviors including uptake among women in Kenya and Nigeria. We recommend this model of care in other low-middle income countries to improve PPFP use.

Introduction

Postpartum family planning (PPFP), or contraceptive adoption within the first year postpartum, is known to improve outcomes for women and infants by preventing short birth intervals [1] [2] [3]. Yet, in low-middle income countries (LMIC), PPFP rates remain low [4] [3]. An estimated 39% of all unmet need for contraception in LMIC is attributed to women who have given birth in the previous 12 months [4].

The antenatal and postnatal periods present multiple opportunities for health care providers to engage women in discussions on postpartum contraception to fulfill this unmet need. Antenatal and postnatal care (ANC and PNC) are entry points for women to access health services during and after pregnancy and can facilitate a continuum of care for women and their children. Theoretically, during ANC and PNC, providers have an opportunity to initiate counseling on healthy timing and spacing of pregnancies through PPFP and to address women's concerns about the side effects of various contraceptive methods. Evidence indicates that multiple high-intensity contraceptive counseling sessions during ANC and integration of PPFP into routine postpartum visits may substantially improve PPFP uptake [5] [6].

In practice, however, standard ANC and PNC (consultations between an individual and her health provider) fall short of meeting the needs of women in LMIC and are a missed opportunity in regard to PPFP [5]. The quality of services vary, and contraceptive counseling is often delayed until postpartum, at

which point over half of women seek community-level or no care rather than facility-based services [7] [8] [9] [10]. Women who attend ANC or PNC may travel long distances and experience extended wait times for hurried interactions with a health care provider. In busy settings, providers often rush from client to client and may deliver sub-optimal care and inadequate contraceptive counseling [6]. This contributes to client dissatisfaction and reduced use of maternal health services [10] [11]. For providers, high caseloads, health worker shortages, and lack of resources contribute to dissatisfaction with the ability to provide quality care [12]. The typical provider-client interaction in this setting does not allow for in-depth discussion of contraceptive methods, their side-effects, or clarifying points to address women's concerns about PPFP [13]. Providers may get bored with repeating the same surface-level information to each woman coming in for ANC.

One potential pathway to improve PPFP uptake in LMIC is the group care model for ANC and PNC. In group care, women presenting for ANC are placed into cohorts with 8-15 other women who are at similar stages of pregnancy. Women attend meetings at the health center as a cohort during pregnancy and through the first 12 months postpartum. Group meetings incorporate one-on-one time for each woman to meet with a health provider for clinical care, which matches that provided in standard ANC and is based on national guidelines set by the Ministry of Health. In addition, the group care model integrates participatory activities, sharing and learning from other women in the group, and facilitates development of a trusting relationship between women and health providers. This model of care allows for in-depth discussions on relevant topics, including family planning, at multiple time points during pregnancy and the postpartum period. Several recent studies have found a positive association between group ANC/PNC and PPFP uptake in a variety of settings, although the mechanisms for this are unknown [14] [15] [16]. Facilitated group discussions, a pillar of the group care model, are known to promote deeper understanding and motivation among adult learners by incorporating social interaction and recognizing that past experiences inform knowledge construction [17]. Facilitated group discussions on contraception

serve to inform women about PPFP options during pregnancy and may influence postpartum contraceptive behavior.

This paper explores women and providers' experiences with facilitated group discussion on contraception in a group care setting in two LMIC: Kenya and Nigeria. By examining elements of care that are unique to the group model, we extract key components that appear to most influence PPFP decision-making and practices. We also discuss family planning-related outcomes at the woman, provider, and facility level in relation to group care processes.

Methods

Study Design

A qualitative evaluation assessed the feasibility and acceptability of group-based antenatal and postnatal care (ANC and PNC) in Kisumu and Machakos Counties, Kenya, and Nasarawa State, Nigeria. The evaluation was one component of a cluster randomized control trial (cRCT) in which health facilities were randomized to provide either group-based or standard/individual ANC and PNC from January 2017 through July 2018 (further details of the cRCT methods are provided in Kabue 2019 and Grenier 2019) [18] [19]. Health providers at both control and intervention facilities received pre-trial family planning (FP) training to ensure that they could provide similar quality of contraceptive counseling and services. In addition to feasibility and acceptability of the model, qualitative research methods aimed to examine mechanisms through which group care brought about change in key study outcomes, including facility delivery and PPFP.

Participants meeting eligibility criteria were enrolled at their first ANC visit into a cohort of women at a similar stage in pregnancy and followed prospectively through the first year postpartum. Participants and providers at health facilities assigned to group care were recruited to participate in the qualitative evaluation. We conducted focus group discussions (FGDs) and in-depth interviews (IDIs) at

approximately 6 weeks after delivery (for providers, after a complete cycle of facilitating group ANC) and shortly after 12 months postpartum (for providers, after facilitating 1 year of group PNC).

This study analyzes qualitative data specific to family planning.

Intervention

For the cRCT, study facilities were randomized to provide either group-based or standard individual ANC and PNC. At intervention facilities, group meetings were scheduled on a fixed day/time and group membership was set so that the same women and facilitators came to each group meeting. Each group was run in a designated space by two trained facilitators, at least one of whom was a skilled provider. Each meeting had the same general structure, starting with self-assessment/co-assessment by the clients themselves and initially taught and supervised by the skilled provider (such as weight and blood pressure using an automated cuff and urinalysis using dipsticks). Self-assessment was followed by facilitated group discussion around pre-determined themes using materials designed for group care. Individual assessments then took place in a private space with only the woman and provider. Each meeting concluded with time for mutual support and social cohesion of the group. The clinical content of ANC was the same for both study arms, delivered according to the local Ministry of Health guidelines. Likewise, meeting topics covered, at a minimum, all counseling and educational topics included in national guidelines.

Each meeting lasted about two hours and was documented as an ANC visit during pregnancy. During meetings, women could submit sensitive questions to the providers by writing the question on a slip of paper and placing it in the "wonder basket." Providers addressed these questions privately with women. Women also had the opportunity for additional private time with the provider on the same day of the group meeting if desired or needed for health and/or safety. Women were told that they should return at any other non-group time if they had questions or concerns. A total of 10 meetings were conducted for each group: six group ANC meetings (in addition to the first ANC intake during which women were

recruited); and four PNC meetings with women and their babies in the year following birth. Group PNC was provided in addition to, and not intending to replace, the standard individual 6-week PNC visit, during which contraceptive counseling occurs.

In comparison to the group care intervention, standard individual ANC and PNC takes roughly ten minutes per woman for each visit. Due to time constraints, information is generally provided didactically from provider to patient with little time for discussion. Although women are told to return at a given date for follow-up, most do not attend the number of ANC sessions recommended by the World Health Organization (four ANC visits at the time of this study, shortly thereafter changed to eight).

Data collection

Researchers gathered qualitative data through semi-structured FGDs and IDIs of women participating in group care as well as FGDs and IDIs of intervention facility providers. We sampled purposively to recruit women and providers across study facilities offering group care and included participants from different facilities in the same FGDs. We determined sample size by assessing the anticipated levels of agreement and variation within the two sub-groups: women and providers [21]. We expected high agreement among providers and medium agreement among women, which, following Romney's guidelines for sampling, indicated that FGDs with providers could be smaller (n=5 per group) while FGDs with women would be larger (n= 10-20 women per group) [21]. Women who shared unique incidents in the FGDs (for example, about an obstetric emergency or PPFP method switching) were invited to provide more details on their experience through IDI. Providers who could not attend the provider FGDs were recruited for IDI to obtain their perspectives. Local research assistants facilitated all FGDs and IDIs, which lasted between 60-90 minutes each. Semi-structured interview guides included prompts related to participant experiences with facilitated discussions on contraception as well as family planning perceptions, intentions, and practices, among other topics. Each IDI and FGD was audio-recorded, transcribed, and translated into English by local staff.

Sample population and study sites

We collected data from two groups: 1) pregnant/postpartum women who attended ANC at intervention facilities in Kisumu and Machakos Counties, Kenya, and Nasarawa State, Nigeria, and 2) group care providers at these facilities. Due to cRCT eligibility criteria, all women had attended ANC at an intervention facility by their twenty-fourth week of pregnancy and agreed to participate in the study. Women were not required to have attended group sessions in order to participate in the qualitative research activities, although most did elect to attend. All but two group care providers were female (1 male reproductive health coordinator was included per country) and had received training on the group care model for ANC and PNC.

While Kenya and Nigeria are both LMIC, they are distinct settings in terms of reproductive health indicators. In Kenya, the modern contraceptive prevalence rate (mCPR) among married women is 62.3%; 48% of pregnant women attend at least 4 ANC visits and 36% of recently delivered women begin using a method of contraception within 24 months postpartum [22] [23] [24]. In Nigeria, the mCPR among married women is 13.1%; 57% of women attend at least 4 ANC visits and 15% use a modern contraceptive method within 24 months postpartum [22] [25] [24].

Analysis

Transcripts were uploaded to Atlas.ti software for inductive content analysis, an iterative process of coding and categorizing words and phrases in order to gain enhanced understanding of underlying phenomena [26]. We coded inductively to draw meaning from the data through open coding followed by code grouping, categorization of code groups, and thematic abstraction. For ANC data, three researchers (Omanga, Onguti, and Whiting-Collins) independently open coded three transcripts from each participant group (6 transcripts in total), then met to compare coding and agree upon a working codebook. The three researchers then coded the remaining ANC transcripts according to this codebook, with regular check-ins throughout the process. For analysis of PNC data, one researcher (Whiting-Collins) continued to conduct coding and thematic abstraction based on the prior codebook and in consultation with the other

researchers. In the following pages, we present findings by theme, illustrated by participant quotes, edited for clarity.

Ethical clearance

This research was reviewed and approved by the Johns Hopkins Bloomberg School of Public Health Institutional Review Board, the Kenya Medical Research Institute Ethics Review Committee, and the National Human Research Ethics Committee of Nigeria. We obtained written informed consent from all participants prior to data collection.

Results

Table 4.1 provides a breakdown of data collection activities by participant type. In total, we conducted 15 FGDs and 21 IDIs at 6 weeks postpartum and 14 FGDs and 17 IDIs at 12 months postpartum. Findings were grouped into two overarching categories: 1) the *Process* of how group care influences postpartum family planning; and 2) the *Outcomes* of this process, as shared by providers and women in group care. The following pages detail these results, first providing insight to the processes followed by outcomes of group care as they relate to family planning.

Processes through which group care influences PPFP

Women and providers compared and contrasted their experiences in group as opposed to individual care. They shared facilitators and barriers to PPFP in both care models, which are presented in Table 4.2. Comments from women and providers revealed a process through which group care influenced PPFP, outlined by the following five themes: 1) Having enough time; 2) Engaging women in care; 3) Creating an environment where women feel "free"; 4) Equipping women with tools to facilitate discussions with their husband/partner; and 5) Continuing care through 12 months postpartum.

Having enough time

Women and providers described contraceptive discussions as more extensive in group compared to standard contraceptive counseling in individual care. This was primarily because of the time allotted

for facilitated group discussions. Women preferred spending time conversing in group rather than waiting to be seen by a provider. One woman even shared that in previous pregnancies she came to clinic for ANC but ended up leaving "because of the queue" (Kenya, Participant). Another mother noted that in group care, providers *"*take time to talk to you" (Kenya, Participant). This sentiment was echoed by providers: "in the individual ANC, we don't have enough time to talk. We have only 10 minutes. In that time, we can't say very much" (Nigeria, Provider).

In the first few minutes of a group care meeting, all women conducted self-assessments and collected data on vital signs for a partner, freeing up "more time to interact" for the remainder of the meeting (Nigeria, Provider). Providers portrayed group care as a more efficient use of their time compared to standard care, allowing them to explain one topic to a group of women, rather than having to repeat messages for each individual visit. One provider noted: "it is time saving and also for the facilitator it is not tiresome" (Kenya, Provider). The group-based model allowed for in-depth discussion of complex topics like family planning, which could be challenging to cover in a typical visit:

> *If I want to talk about family planning methods to one client and I have 20 ANC mothers waiting… I will not be thorough. I will be shallow, and I will also feel fatigued. It can be an easy topic, but I will not be comprehensive enough to tell the mothers each and every method the way they work and its disadvantages and advantages… It is tedious doing that one topic….to one individual [in] ANC as opposed to or compared with group ANC.*
>
> *(Kenya, Provider)*

Providers expressed that even if they were able to describe FP methods in an individual visit there would not be enough time to confirm whether the patient understood the information provided. In contrast, time allotted for group discussion about FP and the participatory nature of group care allowed providers to solicit feedback from participants. This enabled providers to understand women's levels of knowledge so that they could explain in a way that addressed any gaps in understanding. "After every

explanation, I try to ask them questions to see if they really understand everything I told them" (Nigeria, Provider).

In group care, providers took the time to ask women to share their experiences with family planning. This stimulated a unique discussion in which women learned from the family planning experiences of others rather than receiving information solely from the provider:

> *In group ANC when you are talking about family planning with these mothers some mothers are not first timers some are para 2 para 3 so I also pose a question to them: 'who has ever used any method?' And I request her to share her experience with a method. So… in doing that it relieves anxiety. It [is] also counselling to other clients who might be worried.*
>
> *(Kenya, Provider)*

Providers acknowledged that asking women about their experiences with family planning could potentially lead to women hearing negative experiences or being given poor advice by others in the group. In practice, however, women often disputed negative or false claims, with some women sharing their own positive experience in each group. During FGDs, women listed fears or health concerns that they had about contraceptive use prior to group care as well as at 12 months postpartum (see all concerns mentioned in Table 4.3). Both women and providers expressed that group sessions allowed sufficient time for women's concerns to be addressed. As one provider described, "before, [we] were only giving the methods without [explaining] the side effects and the mothers used to fear the family planning because of the side effects" (Kenya, Provider). In contrast, group care allowed providers time to go into "deep" detail describing how each method worked and why some women may experience side effects with certain methods (Nigeria, Provider). One woman explained:

> *Some people feared. Maybe you used another [method] and it cause you problems. [You may] say 'this thing caused me problems; I can't use it.' But we were taught well until [we] knew the*

benefits and disadvantages [of each method]. For me, I got the benefit; now I can do family planning without asking anyone.

(Kenya, Participant)

Group care providers shared that they had enough time to thoroughly explain that women have different experiences and that a method that worked for one woman may not be the best method choice for another. Individual needs and preferences were emphasized particularly as providers supported women during pregnancy to make plans for PPFP. Much time was spent discussing side effects in order to assist women in selecting their preferred method. For example, in Nigeria:

A major issue for women in [group care] concerning implants was blood spotting when on the implant. For Muslim women, if you are fasting, and then you are menstruating, you cannot continue your fasting. So, [Muslim women] do not like the implant for this reason. They would prefer no bleeding at all, or bleeding during 4 days only.

(Nigeria, Provider)

Women said that facilitated discussions allowed for them to select a method and make a plan for postpartum contraceptive use, which they hadn't done before. As one woman said, "after explaining…you know what you are supposed to do" (Kenya, Participant). In all FGDs, women reported that they selected a PPFP method during group ANC.

Engaging women in care

Women and providers described a stark difference in how women participated in standard versus group care. In individual care, women recalled feeling ignored while providers described women as bored. One woman explained: "in [individual ANC] they just examine you and you are not taught. Even if something is happening to you, [you] don't know" (Kenya, Participant). Providers described the lack of engagement in standard care this way: "some women will just sit down from the beginning to the end, they won't even say anything" (Nigeria, Provider). "[In] individual ANC services, mothers are anxious; they do not know what is happening. They are waiting, waiting [with] no explanation. They are not

participating." (Kenya, Provider). One participant shared her contrasting experiences in the two care settings:

> *When you go to [individual ANC] you are told give 'me your hand.' They assess your pressure but they do not tell you why they are assessing you, [or] its importance to your health and the health of the baby. They don't even tell you how is the pressure. When it came to the time of delivery [for my older child] my pressure had to be stabilized because my blood pressure was high. Yet the service provider never told me that my pressure was high. But here [in group ANC] we could ask questions and get answers.*
>
> *(Kenya, Participant)*

In every FGD, women described feeling recognized and informed in group care. From the first group care meeting, they gained confidence by learning how to do individual assessments including taking blood pressure, weight, and filling a self-assessment card. In several FGDs, women shared that their husbands were impressed by these new skills and encouraged them to attend group care to learn more. As self-assessment got women interested and in tune with their own health, it also instilled a sense of women's roles in and responsibilities for their health. One provider described how giving women active roles in their own care generated a sense of shared responsibility, in effect leading to more effective discussions: "we empower them and allow them to give us their ideas first then talk about ours... So, in group ANC the staff are focused, the clients are focused" (Kenya, Provider). This shift allowed women to prioritize their own health by using family planning. As one woman said:

> *Mostly what I love so much, is just how to take care of yourself…They told us how to take our family planning serious so that we would not get pregnant close to our [previous delivery].*
>
> *(Nigeria, Participant)*

Group discussions and participatory activities ensured women's engagement, contributing to women feeling ownership in their care and in their PPFP decisions: "In our group we shared and we

asked each other what [family planning method] each person was using, the effects, and from there we made decisions" (Kenya, Participant). Facilitated discussions on contraception prepared women to anticipate side effects they may experience with specific methods and to distinguish between side effects and more serious health concerns. In this way of delivering ANC and PNC services, women viewed bothersome side effects such as bleeding as a signal to talk to her doctor and potentially switch methods rather than discontinuing all together. In FGDs, women emphasized that each individual should discuss PPFP with a provider to ensure choosing a method that is right for her. Emphasis on individual preference and choice instilled a sense of ownership, as women felt well-informed and confident in their PPFP plans. "It was as a result of what they taught us that I decided to go for [family planning]" (Nigeria, Participant). This engagement went beyond group meetings, and surfaced when women from group care came back to the facility to uptake PPFP: "If I want to go for family [planning] and I go to the health facility, maybe they are giving me a method [that] I do not want… I [am] able to speak out and say 'I do not want that method" (Kenya, Participant). One provider echoed:

> *People that undergo [group care] will just come direct to tell you 'Auntie, it's implant I want.' … But those that went through individual ANC … just go like 'umm … which one do you think is good for me…?' In [group care] the women have confidence [and] knowledge of family planning.*
>
> *(Nigeria, Provider)*

Creating an environment where women feel "free"

At the onset of group care, providers and women agreed upon group norms, which set expectations that the meetings provide a safe space for discussing sensitive and confidential information. As one provider explained: "knowing that they are protected by the norms, they are free and they talk" (Kenya, Provider). In FGDs, providers described this process in detail:

> *We try to form a community and we try to encourage women that yes, we are now sisters and we should mix together … I try to tell them that our secret should end here,*

we shouldn't take anybody's secret outside, so anything that we are discussing should end in this place. They are more confident that yes, they can come out to say whatever thing they think is disturbing them so that we can share and help each other with that.

(Nigeria, Provider)

Women echoed these sentiments, expressing that they could confide in others in the group about difficult problems and secrets that they may have trouble discussing with her husband, such as choosing a family planning method her husband opposes. One woman shared: "[I] am able to hear other members asking about their problems hence giving me courage to ask about my challenges too" (Kenya, Participant). Another woman described the group dynamic as family-like:

What I enjoyed the most [was] the way we sit in a circle and interact like one family and how they give us the chance to ask questions … it was really like a family thing because we ask questions that you cannot just ask anybody. These are things that do not happen at the general antenatal because you feel you cannot ask such questions … you will feel they will not keep your secrets.

(Nigeria, Participant)

The environment of group care seemed to give women "a feeling of belonging" which enabled them to develop confidence to share in the group (Nigeria, Provider). One woman expressed: "you have a team that motivates you by the way they share. The way you learn from the group is not the same as the way [you] will learn when [you] meet the doctor as an individual" (Kenya, Participant). A provider illuminated:

In the individual [care] you have some that can stand up boldly and talk to you, but some will just keep on hiding. But with the group, those ones that were shy they too will also develop on how to talk, how to discuss things together with us, since they know that this woman, she is just like me, so why should I be hiding myself again?

(Nigeria, Provider)

Establishing a trusting relationship between women and the provider facilitating group care was essential for family planning uptake, particularly in Nigeria where PPFP use is less common: "One or two women in the group will share their experiences [using family planning] which will even sometimes motivate others," one provider explained, "if they really want… they can come privately [if] they don't say it in that group but it's in their mind, then privately they come to you later" (Nigeria, Provider). Having the autonomy to discuss in group or individually with a health provider allowed women to benefit from group discussions while also maintaining privacy.

Women who felt shy posing sensitive questions to the group were given the option to use the "wonder basket" to anonymously ask sensitive questions:

> *In our group we had a 'wonder basket' that one used to write questions, put in the basket, and we all [got] answers at the end of the meeting. We kept secret[s]. Everything that we discussed [in] the group was confidential and only known by the group… So, we respected each other.*
>
> *(Kenya, Participant)*

Equipping women with tools to facilitate discussions with husbands/partners

While standard ANC generally encouraged husband/partner attendance, components of group care were purposefully constructed to engage husbands/partners in family planning education and decision-making. All husbands/partners were invited to attend a facilitated group discussion on contraception during the 3rd ANC session.

> *There was a time they said we should come with our husbands. We came with them, and they had discussions with them, and [our husbands] were also [given] advice on family planning… that we and them (husbands), we should choose together the one we feel is most suitable or preferable for us. So, if we discuss with our husbands, I don't think they will refuse.*

(Nigeria, Participant)

I went with my partner and we learnt and choose the method together.

(Kenya, Participant)

Additionally, take-home booklets contained material to facilitate conversations with a husband/partner. Women whose husbands could not attend the meeting described utilizing the group care take-home booklet to explain the family planning lessons to their husbands and facilitate joint decision-making: "I was taught and understood everything … I went home and taught him. Everything was well and we used [the booklet] to cooperate" (Kenya, Participant). Women also shared that when their husbands expressed concerns about family planning, or asked questions, "now we have answers to give them. And because they can see the print outs… they see what you are telling them. They find it's useful and it help[s] him." (Kenya, Participant).

As joint family planning decision-making was emphasized in group, several women shared the process of selecting and agreeing upon a method with her husband/partner:

For me, I did not have any problem. But [my husband] he had a problem as he had not learnt what I had learnt [in group]. So, I told him he can Google to know if there is any problem [with a method]. So, for him he googled and knew the method we had decided to use, he learnt all the advantages and the disadvantages of the method we wanted to use.

(Kenya, Participant)

While many women described telling their husband that they would use a specific method and him agreeing, this was not always the case. One woman described a compromise:

On family planning, I told him I wanted this one, he said no, not yet. When I explained to him that we can also use condom and he accepted, I came back to the clinic and they gave me the condom… It was male condom. Honestly, he was pleased with it.

(Nigeria, Participant)

For women whose husband's opposed family planning, group encouragement at times provided guidance on how to involve the husband in a way to help him understand the benefits of PPFP:

> *You find out that the woman will say, her husband said she should not do family planning…The women there will advise her, 'Let me tell you family planning is good. When you do family planning, it is not that it will stop you from getting another child.' Some will say, 'Even I did it'... Some of them will now use themselves as examples. [And after delivery] They will come back [for family planning]. Some of them will even come with their husbands so that their husbands will hear.*
>
> *(Nigeria, Provider)*

Continuing care through 12 months postpartum

The continuous nature of group care from antenatal through the first 12 months postpartum allowed for routine follow-up with women and increased opportunities for PPFP uptake. Providers noted that consistent interactions with women over the course of pregnancy allowed them to build a relationship that typically would not exist in standard individual ANC.

> *It is so much better you can't compare. Because in individual care, once the date is given for next visit there is no follow-up. And whether a woman comes back or not nobody will ask why. But in group ANC even if it's just one person that is absent, we will call the person to find out why.*
>
> *(Nigeria, Provider)*

In part because of this relationship and continuity of care, in both Kenya and Nigeria, providers expressed they were able to better support contraceptive uptake and management in group as compared to standard care. Facilitated group discussions on methods and side effects during pregnancy assisted women in making a plan for PPFP and prepared them for switching methods in case they found side effects to be bothersome:

During group ANC we really tackled the methods with them. Even when a mother commences a method and want[s] to change, [she] will come and tell you, 'I want [to] use this method'…You will ask her 'why are [you] preferring this method and not the one that you have been using?' [She] will tell you … 'I want to use [the copper IUD] because you said it doesn't have any hormone in it.' So, during [PNC] the mother is already knowledgeable … you do not have hard time training her on the methods.

(Kenya, Provider)

Providers in Kenya noted a trend in method switching among women in group care: "they are changing from short-term to long-term [contraception]" (Kenya, Provider). Women shared experiences switching methods due to side effects more often in Kenya FGDs compared to Nigeria. One woman provided some insight to this, describing how she came to understand family planning better through practice: "when you experience [using family planning] now is when you will get the reality of it, [more] than when you are just being taught and you just get to hear it" (Kenya, Participant). In Kenya, women who experienced side effects shared that they sought care from a health provider who explained what was happening and provided reassurance; some decided to switch methods, while others waited to see if side effects would subside. In contrast to Kenya, several women in Nigeria FGDs expressed selecting non-hormonal methods to avoid side effects. Among women who did select a hormonal method in Nigeria, follow-up to ensure a proper fit was emphasized:

What they said is, 'if you see anything like that you come back to us.' Some of the menses you don't see, that it is normal, that's what they taught us. They said it is normal while some is abnormal, so when they check they will know if it's ok or not.

(Nigeria, Participant)

Providers noted that PPFP uptake occurred at different rates, and that women slower to uptake were encouraged by examples shared by others during the PNC meetings. As the first postpartum meeting occurred at 3 months postpartum (after the standard PNC visit at 6 weeks postpartum) some women began using family planning before the first group PNC meeting. Women sharing their

experiences in group appeared to influence how others thought about family planning, as recounted by one provider:

> *[In] the [group PNC] meetings, with the mothers sharing their experiences with family planning method it's somehow encouraging to the others who haven't taken family planning to go for the methods. So, they would share the experiences and that again would pull out the misconceptions. Then other mothers were encouraged, and they would pick the methods.*
>
> *(Kenya, Provider)*

Meeting several times postpartum allowed multiple opportunities to problem-solve to help women fulfill or adapt their PPFP plan. For example, some women required additional support while transitioning from LAM to another modern method. One woman explained: *"*I started using LAM, after six [months] I did implant, then I started seeing bleeding on and on. I went and removed it. We are now using condom[s]" (Nigeria, Participant). One provider elucidated, "we tell them if you have any problem with the family planning that you are given today you can come back to the facility so that we can change for you another method" (Kenya, Provider). Another provider added:

> *Because they are still in the group, they continuously get more knowledge regarding family planning. So, in case of any challenge with a method they will clarify. You see they are still there with you.*
>
> *(Kenya, Provider)*

Follow-up over 12 months postpartum also allowed time for women to initiate PPFP at their own pace: "When the right time comes, I will do family planning" (Nigeria, Participant).

Postpartum family planning associated outcomes shared by women and providers

Women-level outcomes

For many women in group care, the sessions provided education on family planning that they had not received previously. Speaking on family planning, a woman in Kenya explained: "through the group meetings, I was able to learn several things that I did not know before" (Kenya, Participant). Another woman in Nigeria said, "about family planning… if I hadn't come for [group ANC], I wouldn't have known" (Nigeria, Participant). Several women described prior lack of awareness on how to use contraception: "then, I did not understand anything…" (Nigeria, Participant). This included women who had children or previous pregnancies and should have received information through contraceptive counseling in the past.

> *And then the most important is about family planning … we were taught about all methods of family planning that I didn't know of. I only knew two but now I know them all.*
>
> *(Kenya, Participant)*

In FGDs, women recalled contraceptive methods and their side effects. Spontaneously recalled methods are listed in Table 4.4. While not universal, some women mentioned that injectables and oral contraceptives could affect breastfeeding. "Breastfeeding" was the term often applied to describe the lactational amenorrhea method (LAM), with poor recall of "LAM" as a method name prior to the FGD moderator mentioning it. When asked to explain the criteria for using LAM to prevent pregnancy, almost all women remembered and could define exclusive breastfeeding, yet about half of women could not recall the criteria of menses not yet returned and stopping LAM within 6 months postpartum.

Women described the advantages and disadvantages of methods, for example benefits of long-acting contraceptives and side effects associated with hormonal methods. Women demonstrated understanding of how hormonal methods may have varying degrees of side effects for different women without being dangerous: "you can get periods or fail to get periods … it doesn't mean anything is a problem" (Kenya, Participant). Another went into detail, saying:

I learned that in family planning there are only two modes that are used; hormonal and non-hormonal. I also learnt that there are types of … family planning that if you use, the drug accumulates in your body and it will affect you. So, it is better to use some such that little drug spreads for a long time and therefore those side effects are minimized.

(Kenya, Participant)

In FGDs at 6 weeks postpartum, women shared plans for PPFP that they developed during group ANC. Implementation of these plans varied. One woman shared: "It was during [group ANC] when they were talking about family planning that I chose a method I would prefer and one week after delivery I came and I did it" (Nigeria, Participant). Such early uptake was more commonly reported in Kenya, while more women in Nigeria opted to practice LAM prior to another method. At 6 weeks postpartum, women reported using breastfeeding/LAM, injectables, implant, and tubal ligation. At 12 months postpartum, women reported using the following methods: injectables, condoms (male), implant, IUD, calendar, tubal ligation, withdrawal, and "breastfeeding."

Most women expressed having confidence in their method choice and in discussing contraception with their provider. For most women interviewed, previous concerns or fears they held about contraceptive use were addressed in the group, although some concerns remained as noted in Table 4.3. One woman explained how her perception of family planning changed during group care:

I have had three children and I have had an attitude towards family planning. I have been thinking that 'oh this family planning is …the government playing with us.' … But then this [group PNC]; the attendants took their precious time and explained in detail about family planning, how [methods] work and what is best and what is just good. So, in that case I made a choice that I think best suits me.

(Kenya, Participant)

However, women expressed varying levels of confidence in discussing and agreeing upon family planning with their husband/partner. Some women in Nigeria shared that they were not using a method

because of husband refusal. Women in FGDs in both settings described covert practice: "I decided I will do the injection. I did the injection… He now asked me, 'you are using something right?' But I denied it" (Nigeria, Participant). Two women in Kenya shared plans to secretly begin contraception by going "far away from" their husbands to initiate family planning (Kenya, Participants). Although these cases are less common, providers expressed awareness of how to support women covertly: "I now counsel. She said she will go with the injection, because even with the injection [he] will not know" (Nigeria, Provider).

Other women shared positive experiences with husband/partner involvement in family planning decision-making:

> *I have never used family planning before but, when we came, they said we should do family planning. I have done it. I like it… [I'm using the] Implant and I am enjoying it. [I] am stronger [and] my husband is also happy. If not for that I will be pregnant by now.*
>
> *(Nigeria, Participant)*

Women demonstrated demand for family planning by listing reasons for uptake. Among the most common reasons were for the health of the child, ability to educate and feed their children, and the mother not being weak from recent birth. A subgroup of women in one FGD in Nigeria described contraceptive use as easing anxiety, allowing them to willingly have intercourse with their husbands without fear of pregnancy:

> *Before, if [I was] nursing a child I [ran] away from my husband (reluctant to have sex) because I [had] never done family planning. But when I came here, they advised me to do family planning. I've done it. I am more relax[ed]. I am not scared of getting pregnant each time I [have] sex with my husband. I am no longer scared… and I am not pregnant.*
>
> *(Nigeria, Participant)*

Despite the prevalence of early postpartum uptake and demand expressed by women in both settings, several women explained that they were waiting to start a method until their menses resumed: "I [saw] my period after weening my baby. Now I want to come for the implant, after seeing my period" (Nigeria, Participant). Non-users in both settings expressed challenges to PPFP uptake, including cost, husband objection, desire for more children, or being single.

Provider outcomes

Providers expressed having more confidence in their abilities for discussing contraception with clients after facilitating group ANC and PNC. Some attributed this in part to the family planning trainings they (and control facility providers) received before starting group care. Providers shared that they learned new information in the training, including about immediate postpartum IUD, implant, progesterone-only pills, and LAM.

> *As caregiver I [had] the best opportunity to practice long-term method[s] because before [the training] I couldn't insert an [IUD] or Implanon. And as a healthcare provider, [the training] really gave me enough information, the best knowledge so far. And I was able to provide those methods without fear.*
>
> *(Kenya, Provider)*

Providers voiced preference for introducing PPFP during group ANC rather than at the 6 weeks postpartum PNC visit, as is standard practice. Having time with women in the group setting allowed for more in-depth discussions and influenced provider self-assurance: "that was where I gained my confidence on how to communicate with the women freely" (Nigeria, Provider). Another provider explained:

> *When we were doing [group PNC], we [tried] to explain to the women …. different methods of family planning. So, the woman now said that …nobody has ever told her about the importance of family planning like this. Like, they can only say 'this is family planning just come and take.' But now, I was able to explain to them how it works, and*

I was able to explain it to them better and it's because we are in the group that I was able to give them that lecture very well like that.

(Nigeria, Provider)

Facility-level outcomes

In FGDs, providers in Kenya discussed noticing improved PPFP indicators at their health facilities after implementing group care. This included increased uptake, especially of long-term methods:

In our facility you find that we talk of more long-term compared to short-term [methods]. The uptake of depo[provera] is almost 1% compared to long-term [methods] like… Copper T and Implant. To me that has improved our indicators. And in my perspective, people can take long terms methods if the information is given well.

(Kenya, Provider)

If you look at the data as compared to [before group care], we used to have a lot of people not taking any method at all or maybe an injectable as a family planning method. But … after cohorting our mothers and [teaching] them to know more about family planning… if you look at the data, it is able to speak for itself. Many of our clients [use] family planning method[s]… especially the long-term.

(Kenya, Provider)

In Nigeria, providers most often discussed individual- rather than facility-level indicators. However, they noted that some facilities having low turnout at the family planning clinic scheduled group PNC visits for the same day, which increased the contraceptive services provided.

Discussion

While previous literature has demonstrated a relationship between group ANC and PNC with PPFP uptake [14] [15] [16], our study provides insight to the mechanism behind this association. In our study, women and providers who participated in a group ANC and PNC intervention in Kenya and

Nigeria distinguished aspects of group-based care that were not found in routine individual ANC and PNC, including: 1) Having enough time; 2) Engaging women in care; 3) Creating an environment where women feel "free"; 4) Equipping women with tools to facilitate discussions with their husband/partner; and 5) Continuing care through 12 months postpartum. Our findings suggest that these processes unique to group care may influence women's postpartum contraceptive behavior.

In FGDs, women reported receiving new information on family planning methods and side-effects through group care and could describe the advantages and disadvantages of specific methods. Providers attributed women's increased understanding of contraception to facilitated group discussions, which allowed for in-depth conversations during which women could share experiences and ask questions freely. By hearing other women's first-hand experiences with contraception, often reinforcing provider's messages, women who previously feared contraception came to understand its value. This echoes Thapa's findings that women in group care in Nepal reported learning from one another's experiences and gaining confidence to discuss health topics in group [27]; in our study, women linked these concepts to PPFP. We found that when women were engaged, given enough time, and felt a sense of ownership of their own care, they learned to differentiate between actual side-effects of specific contraceptive methods and concerns that were not based on medical evidence. This was very different from women's previous experience in standard care, which was described as a didactic information transfer from provider to client. Furthermore, the group care schedule from mid-pregnancy through 12 months postpartum enabled planning for PPFP during group ANC and follow-up to support contraceptive uptake and problem-solving if women faced obstacles in implementing their PPFP plan. Many women shared that they planned for and practiced PPFP for the first time because of group care. Providers also noted a positive effect of group care on PPFP planning and utilization, confirming findings from recent studies in Nepal, India, and Rwanda in which providers shared similar observations [27] [28] [29].

Vygotsky and Knowles' theories on adult learning provide insight as to why facilitated group discussions were effective for learning about contraception [17]. Vygotsky's cognitive and social

development theory emphasizes social interaction and communication as necessary elements to learning [17]. Knowles' theory on andragogy (adult learning) recognizes that adult learners are self-directed, internally motivated, have previous experience to draw from, and seek practical learning [30]. The group care model aligned with these theories while also incorporating reflective processes that led to collaborative learning [31]. In short, group care provided an ideal environment for adult learning about contraception that could not be replicated in individual care.

Consequently, facilitated group discussions on contraception during group ANC and PNC may serve as a compliment to individual counseling at 6 weeks postpartum. Participation in facilitated group discussions seemed to provide women with the understanding they needed to come into the individual contraceptive counseling session prepared and more confident in expressing their preferences and concerns to the provider. Also, facilitated group discussions appeared to address most fears women had about contraceptive use. Resolving these in the group setting freed up time for providers to discuss women's specific needs during one-on-one counseling. Having women equipped with knowledge on PPFP during ANC also seemed to make individual contraceptive counseling more efficient and satisfying for providers because they did not need to worry about providing all of the information on family planning for each client and instead could focus counseling to meet an individual's needs. Women in our study expressed preference for prioritizing individual needs in this way, echoing findings from other settings [32]. The time-saving aspect of group care from a provider's perspective parallels findings from a group-based contraceptive counseling intervention in Ghana [33]. Our study contributes to this body of evidence by demonstrating how facilitated group discussions prior to individual counseling can make those individual sessions more effective.

Despite these positive findings, some misconceptions remain that effect women's postpartum contraceptive behaviors: the notion that a woman cannot get pregnant before her menses returns and equating any degree of breastfeeding with LAM. Widespread reliance on return of menses as an indicator for contraceptive initiation complicates PPFP uptake in a variety of settings [34]. Many women wait for

the return of menses before starting a PPFP method, believing that they cannot become pregnant before menses return [35] [36]. Providers often confuse women and delay contraceptive initiation by insisting on menstruation as evidence of non-pregnancy prior to offering family planning methods to postpartum women [34]. Also, in our study, reports of breastfeeding as a method to prevent pregnancy at 12 months postpartum suggests misunderstanding of how LAM works and indicates that some women believe themselves to be using a contraceptive method when they are not actually protected from pregnancy. Our findings show poor recall of guidelines for LAM, specifically the criteria of menses not yet returned and stopping LAM within 6 months postpartum.

These issues reveal a need for health provider training on counseling women about fertility indicators and a shifting in norms to provide contraception to women before menses returns. As these are common issues in a variety of LMIC settings and facilitated group discussions show potential for addressing such misconceptions, we recommend the group care model as a potential avenue for change. Furthermore, given our findings, including that both women and providers in our study expressed a strong preference for the group care model, we recommend that health systems and governments in LMIC embrace this model of care. While this care model may be adjusted for setting, we recommend maintaining the group meetings through the first year postpartum to facilitate successful PPFP practices and prevent short-birth intervals.

Strengths and limitations

We took several steps to ensure that our research met the quality criteria for trustworthiness in qualitative research, as detailed in Korstjens 2018. We established credibility by triangulating the sources of data (from providers and women) and by collecting qualitative data at two time points: after ANC and PNC separately. We kept records of our research path and triangulated analysis among our study team, contributing to the dependability and confirmability of findings. Our descriptions of context for both standard and group-based care are meant to inform transferability to similar LMIC settings where women and providers face the noted challenges in standard individual care [37].

A limitation of this research is that we gathered information only from women and providers in the intervention arm. It could be useful to have qualitative data with women in the control group for comparison. However, multiparous women in the intervention arm and group providers also giving individual care compared and contrasted their experiences in both settings, lending insight to the counterfactual. Also, given the scale of the parent study, focus group discussions covered a wide range of topics in addition to family planning. Qualitative exploration focused exclusively on PPFP could have garnered more rich data on this topic.

Conclusions

Group-based ANC and PNC provided a unique experience for women and providers and influenced postpartum contraceptive behaviors among women in Kenya and Nigeria. We recommend this model of care in other LMIC settings to improve PPFP indicators and promote healthy timing and spacing of pregnancies.

Tables

Table 4.1 Data collection activities by participant type

Participant Type	ANC (collected at 6 weeks postpartum) Kenya: 76 women, 22 providers Nigeria: 69 women, 23 providers		PNC (collected at 12 months postpartum) Kenya: 75 women, 21 providers Nigeria: 43 women, 9 providers	
	Method of data collection		Method of data collection	
	Focus Group Discussion	In-depth interview	Focus Group Discussion	In-depth interview
Kenya				
Women	5	14	7	8
Providers	2	1	2	0
Nigeria				
Women	6	4	4	7
Providers	2	3	1	2
Total activities	15	21	14	17

Table 4.2 Family Planning inputs in context of care, comparing standard/individual to group antenatal and postnatal care in Kenya and Nigeria

Family Planning Inputs in Context of Care	
FP counseling in standard/individual care	**Facilitated discussion in group care**
Antenatal care	
Limited time for discussion, competing priorities may not allow time to talk about PPFP (each session is about 10 mins total)	Ample time for discussion of PPFP (each session is between 1-2 hours total)
Didactic interaction with provider; facility staff take women's vitals without explanation and women feel passive in care	Trusting relationship built with provider; women do self-assessments to take their own vitals at the start of each session, become active participants in care
Provider doesn't have time to gauge patient's level of awareness on FP, understanding of information shared	Provider is able to check that women understand FP information, ask clarifying questions, and provide thorough responses
Provider may or may not guide woman to select a PPFP method and plan for uptake	Provider guides women to consider different methods of PPFP and create an individual plan for uptake
Women only hear of FP methods and side effects from provider	Women hear about other women's experiences with FP methods and side effects in addition to learning from provider
Women's concerns about FP methods often dismissed as "rumors" or "myths"	Women's concerns about FP methods identified as "rumors" or "myths," yet discussed thoroughly, rationale for side-effects explained and concerns addressed by other women sharing experiences that disprove, reinforce provider's messages
Husband/Partner encouraged to attend	Husband/partner invited to attend special session focused on family planning method selection (3rd GANC meeting)
Women unlikely to receive advice on how to engage husband in FP discussions at home	Take-home booklets provided to women offer tools for discussing FP with husband/partner at home
Women may be afraid to initiate conversation about FP or ask sensitive questions	Women learn from the answers to others' questions; sensitive questions are posed to providers anonymously through use of the 'Wonder Basket'
Postnatal care	
Contraceptive counseling occurs at 6 weeks postpartum, combined with postnatal check-up; limited time for FP discussion	Contraceptive counseling occurs at each postnatal meeting (at 3, 6, 9, and 12 months) through group discussions; ample time for FP discussion
Women may be able to uptake a method the same day, or need to come back	Women can uptake a method at any of the postnatal meetings or come back
If a woman wants to start a method after the PNC visit she will most likely need to attend an FP clinic	Women have connection with a provider who can supply different methods, they may contact the provider for follow-up to begin a contraceptive method
If a woman begins using a method and runs into problems she may discontinue	If a woman begins using a method and runs into problems she can discuss with her provider and group to get feedback and find solutions such as switching methods
No formal follow-up to assist women in postpartum contraceptive uptake	Routine follow-up on plan for postpartum contraceptive uptake is built into every session

Table 4.3 Resolved and current fears/health concerns about contraception, as reported by women in group care in Kenya and Nigeria at 6 weeks and 12 months postpartum

Health concerns and fears related to contraception	
Concerns women held prior to group care, reported at 6 weeks postpartum	**Concerns women presently have, reported at 12 months postpartum**
Women expressed prior concern that contraception could cause: • Weight loss • Decreased libido • Infertility • Giving birth to an abnormal baby • Obstructed labor • No menstrual cycle because blood accumulates in the body • Cancer • No menstrual cycle, which causes cancer • Excessive bleeding will continue for the same duration of time a woman practiced family planning • A growth in a woman's stomach • "It spoils the uterus" • "You will stay long before you conceive" • The IUD can travel in a woman's body during intercourse • Death • Decreased libido in partner • Chest problems or TB after contraceptive implant • Weakens the immune system • Headaches • Backaches • Stomach pains • Contraceptive pills accumulate in the body • Injectable contraceptives made with drugs intended for dogs • A woman will conceive and deliver a baby that has an implant or IUD in the body	**Women expressed present concern that contraception could cause:* • Excessive bleeding • Infertility • Difficulty in getting pregnant for a long time • Weight loss • Weight gain • No menstrual cycle • Feeling ill • Backaches • Headaches • Implant can cause blockage of the uterus causing miscarriage • Decreased libido • Swollen legs • Itching from contraceptive pills

*While most women reported having had concerns prior to contraceptive counseling in group, a subset of 4-5 women expressed still having concerns presently at 12 months postpartum

Table 4.4 Contraceptive methods spontaneously recalled at 6 weeks and 12 months postpartum among women in group ANC and PNC, Kenya and Nigeria

Contraceptive methods spontaneously recalled by women in group care, Kenya and Nigeria	
Recalled at 6 weeks postpartum	**Recalled at 12 months postpartum**
1. Injectables 2. Condoms (male and female) 3. Implants (5 or 10 years) 4. Intrauterine device (IUD) (5 or 10 years) 5. "Breastfeeding" 6. Oral contraceptive pills (for 28 and 21 days) 7. Withdrawal 8. Tubal ligation	1. Implant 2. Oral contraceptive pills 3. Condoms (male and female) 4. IUD (3, 5, or 10 years) 5. Tubal ligation 6. Injectables 7. Withdrawal 8. Vasectomy 9. "Breastfeeding" 10. Immediate postpartum family planning[1]

[1]Immediate postpartum family planning refers to IUD or implant given before a woman leaves the birthing facility. This method type was most often mentioned in Kenya.

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Chapter 5. (Paper 2) Time to postpartum contraceptive uptake and understanding of fertility return among women in group versus standard antenatal and postnatal care, Kenya and Nigeria

Abstract

Background

In low-resource settings, rates of postpartum contraception remain low despite evidence that uptake within the first year postpartum is beneficial to mothers and infants. We investigated whether group-based antenatal and postnatal care influences time to uptake of modern contraception and women's understanding of fertility return in the first 12 months postpartum. Data are from a cluster randomized control trial of group versus standard antenatal and postnatal care in Kenya and Nigeria.

Methods

We performed Cox proportional hazards regressions to assess time to modern contraceptive uptake, excluding the lactational amenorrhea method (LAM), comparing study arms. Time to uptake was assessed first from birth and then from the postpartum month of key fertility return indicators. We conducted Lifetable analysis and produced Kaplan-Meier curves to display differences in probabilities of modern contraceptive uptake across the first 12 months postpartum. We evaluated women's knowledge of LAM criteria and LAM practices by t-test for proportions, comparing women in group to standard care.

Results

Women in group care had higher rates of modern contraceptive uptake in the first 12 months postpartum compared to women in standard care, although this difference was not significant. The greatest differences in probabilities of modern contraceptive uptake were seen in the months following postnatal

meetings, during which women in group care were more likely to begin contraception than women in standard care. Significant differences were found between study arms in understanding of LAM requirements. Of women who reported using LAM, in Kenya 69.6% in group care vs. 25% in standard care met the criteria for effective use while in Nigeria, 61.7% of LAM users in group and 48.0% in standard care fulfilled the criteria (not significant in either setting).

Conclusion

Results suggest that group care may influence women's contraceptive behavior in a way that is protective against short birth-intervals by promoting early modern contraceptive uptake and emphasizing understanding of factors related to fertility return.

Introduction

Postpartum family planning (PPFP) uptake, or modern contraceptive initiation within the first 12 months postpartum, encourages healthy birth spacing and is associated with improved outcomes for women and infants [1] [2] [3]. Although few women in low and middle-income countries (LMIC) desire to conceive during the postpartum period, PPFP rates remain low [4]. Low perceived risk of pregnancy and poor understanding of fertility return are contributing factors [5].

In settings where contraceptive services are readily available, supporting women to understand and identify indicators of postpartum fertility return can facilitate PPFP uptake. Understanding how the risk of pregnancy changes over the postpartum period allows women to reduce their risk of an unwanted pregnancy by initiating contraception when menses returns or when exclusively breastfeeding stops, if not earlier.

How women practice the lactational amenorrhea method of contraception (LAM) can serve as a proxy for assessing postpartum women's comprehension of fertility return and pregnancy risk. LAM relies on women's awareness and understanding of factors affecting fertility return including exclusive

breastfeeding and menstruation. Research shows that in LMIC only 26% of women who report using LAM actually meet the criteria for effective use, meaning that they are not exclusively breastfeeding or that they have reported using LAM after menses return or after 6 months postpartum when it is no longer an effective method [6]. Researchers estimate that such misunderstandings contribute to approximately 1.5 million women across 45 LMIC incorrectly believing that they are using an effective contraceptive method when they are not. [6].

Contraceptive discussions during antenatal and postnatal care (ANC and PNC) should emphasize concepts of fertility return so that a woman is prepared to effectively practice LAM or to choose when to initiate another method. Standard provision of contraceptive counselling at 6 weeks postpartum misses the critical period for teaching about LAM criteria, which would ideally occur antenatally or immediately postpartum. Furthermore, competing priorities and time constraints faced by providers in busy healthcare facilities mean less time for in-depth discussion of fertility return, contraceptive methods, and opportunities for uptake in the first year postpartum [7] [8] [9].

Group-based antenatal and postnatal care (group ANC and PNC) have been found to increase PPFP uptake in both high resource and LMIC settings [10] [11] [12] [13]. Although the mechanisms behind this association are unclear, group care provides an opportunity for more thorough and effective discussions on return to fertility and PPFP including LAM. Through facilitated group discussions, group care offers social support for practices like exclusive breastfeeding and transition from LAM to another contraceptive method. Research is needed to better understand how group-based care might improve understanding of fertility return to support birth spacing and whether women in group care practice earlier contraceptive uptake in the postpartum period compared to women receiving standard, individual care.

In this paper, we investigate time to uptake of modern contraception in the first 12 months postpartum and explore understanding of fertility return among women in group versus standard care.

Methods

Study design

We performed secondary data analysis of a cRCT of group versus standard ANC and PNC we conducted in Kisumu and Machakos Counties, Kenya, and Nasarawa State, Nigeria, from January 2017 through July 2018 (referred to as the parent study). Details of the parent study design, including eligibility criteria, are documented elsewhere [14]. In brief, participants were enrolled at their first ANC visit and followed prospectively until 12 months postpartum. Health facilities were matched and randomized to provide either a continuous package of group-based care starting at women's second ANC visit and lasting through 12 months postpartum or the standard of care (i.e., individual clinic appointments). Intervention implementation occurred in two phases: ANC enrollment through 3-6 weeks postpartum (Phase I, consisting of 6 group meetings during pregnancy), and from 3-6 weeks through 12 months postpartum (Phase II, consisting of 4 group meetings after delivery). In pregnancy, meetings occurred every 4 weeks; postpartum meetings occurred every 3 months. Quantitative data was collected from all participants and group care providers at enrollment and at the end of each phase.

Intervention

Women attended group sessions on a fixed day/time and membership was set so that the same women and facilitators came to each meeting. Two trained facilitators, at least one of whom was a skilled medical provider, conducted each meeting in a designated space. Meetings had the same general structure: 1) Self-assessment/co-assessment by the clients themselves, initially taught and supervised by the skilled provider (such as weight and blood pressure using an automated cuff and urinalysis using dipsticks); 2) Discussion around pre-determined themes relevant to stage of pregnancy or postpartum period using materials designed for group care; 3) Individual assessments by the provider in a private space; 4) Time for mutual support and social cohesion of the group.

Group care providers encouraged women to bring their husbands/partners to the third session of ANC, which was devoted to postpartum family planning. This and other group ANC meetings included promotion of exclusive breastfeeding, LAM, contraceptive choice, and making a plan for postpartum family planning. In group PNC, discussions revolved around women's experiences, including obstacles and stories of success with implementation of their plan for postpartum family planning. PNC sessions also allowed for conversations about side-effects and support for switching methods. Additional details of the intervention can be found in Grenier et al 2019.

Study sites

The parent study countries are different in important ways. According to comparable government data from the Demographic and Health Surveys, women aged 15-49 who had a live birth in the last five years in Kenya were more likely than those in Nigeria to have attended ANC during pregnancy (96% in Kenya compared to 67% in Nigeria), delivered in a facility (62% versus 39%), and practiced exclusive breastfeeding (61% versus 29%) [15] [16]. Kenya recently surpassed its Family Planning 2020 goal, with 62.3% modern contraceptive prevalence (mCPR) among women married or in a union [17]. In contrast, Nigeria's mCPR of 13.1% among women married or in a union is one of the lowest in the world [17]. Postpartum CPR (any method used within 0-23 months) is estimated at 36% in Kenya and 15% in Nigeria [18]. In 2018, the total fertility rate (TFR) was 3.5 in Kenya and 5.4 in Nigeria [19]. Of non-first births in the last five years, 18.0% in Kenya and 25.0% in Nigeria occurred in less than two-year intervals [15] [16].

Kisumu is located in Western Kenya bordering Lake Victoria, and Machakos borders Nairobi. Nasarawa is located in central Nigeria bordering the nation's capital, Abuja. While both Machakos and Nasarawa are primarily agricultural economies, Kisumu functions as a trading hub for Western Kenya. The TFR for Kisumu is 3.6 and for Machakos is 3.4 births per woman [15]. The total fertility rate in Nasarawa State is 5.3 births per woman [16].

Data collection

Data were collected at enrollment and in the Phase II survey. This included sociodemographic information gathered from participants at the health facility at study enrollment as well as data collected from women in their homes at 12-months postpartum. Research Assistants administering the surveys recorded participant responses using *RedCap* mobile technology for remote data upload from a tablet to a cloud-based secure server.

In addition to information on maternal and infant health, the Phase II survey gathered data on contraceptive behaviors (including adoption, discontinuation, and switching) in the first 12 months postpartum. We asked all participants to report the timing of menses return, infant feeding practices, and resumption of sex postpartum to gain insight to fertility return. Research Assistants guided all study participants who reported any family planning use in the first 12 months postpartum to complete a history of their contraceptive behaviors in that period with the aid of a visual contraceptive timeline. Participants answered a series of questions about the requirements for appropriate LAM use and were separately asked about their own practices to assess correct use among those reporting LAM.

Measures

All time-based variables were recorded by month postpartum, or the infant's age in months at the time of event. We measured month of modern contraceptive uptake (with and without inclusion of LAM) from birth, as well as from the month of first sex postpartum and the month in which indicators of fertility return were reported (end of exclusive breastfeeding and menses return, separately).

We created a measure for duration of exclusive breastfeeding using women's responses to questions about the timing of introduction of various foods in their infant's diet. Women were considered to have exclusively breastfed for the period in which their infant was not introduced to any food or drink (including water) other than breastmilk.

We generated a composite variable for adherence to LAM criteria among women who reported using this method. Women were considered to adhere to LAM criteria if they reported stopping LAM before or at 6 months postpartum and before the month of menses return and/or cessation of exclusive breastfeeding.

Sample size

631 women in Kenya and 873 women in Nigeria completed the Phase II survey. We excluded data from 4 women in Kenya (3 intervention, 1 control) and 38 women in Nigeria (18 intervention, 20 control) due to infant death. The final sample for analysis was 627 women in Kenya (313 intervention, 314 control) and 835 women in Nigeria (421 intervention, 414 control). For both countries, each study arm had 10 facility-level clusters, for a total of 20 clusters in each site. Loss to follow up (LTFU) was similar between study arms in both sites.

It should be noted that a priori sample size calculations were conducted for the parent study outcome of facility-based delivery, which was measured in the Phase I survey. The study was powered to detect a 15% increase in this outcome, with the required sample size of 410 women in each arm in Kenya and 430 in Nigeria exceeded by the Phase I sample (826 Kenya, 1,018 Nigeria).

We conducted clustered survival data power calculations [20] for the primary outcome of this secondary analysis: uptake of modern family planning during the first 12 months postpartum, excluding LAM. In Kenya, 80.2% of the intervention and 73.9% of the control group reported use of modern contraception postpartum; in Nigeria, 56.3% of the intervention and 28.7% of the control group reported this outcome. For Kenya, these proportions lead to an estimated 340 uptake events which, with an ICC of 0.00 (calculated based on assumption that the control group reflects pre-intervention baseline status), requires a minimum of 14 clusters. In the Nigeria data, an estimated 129 events and ICC of 0.03 leads to a minimum requirement of 8 clusters. At 12-months postpartum, both samples exceed the required number of clusters for this outcome.

Statistical Analysis

We compared sociodemographic characteristics of the sample at enrollment by intervention arm using t-tests for proportions that accounted for clustering in the data at the health facility-level. We assessed LTFU by sociodemographic variables and intervention status through generalized estimating equations that adjusted for clustering in the data.

We initially investigated time to modern contraceptive uptake (including and excluding LAM) using survival analysis methods, including Cox proportional hazards regressions adjusted for health facility as the shared frailty parameter and employing the Efron method to handle tied failures. Due to a significant proportion of women in the intervention group using LAM immediately postpartum, inclusion of LAM as a method for uptake in this model violated the proportional hazards assumption. Therefore, we continued with survival analysis only for time to modern PPFP uptake excluding LAM and assessed LAM practices in separate analyses. While LAM uptake was excluded, uptake of another modern method *after* LAM use was included in all survival analyses. Data on month of uptake were missing from 21 contraceptive users in Nigeria (2.5% of full sample) and 28 in Kenya (4.5% of full sample). We first assessed time to modern contraceptive uptake excluding LAM with birth as t_0. Additional analyses assessed time to modern contraceptive uptake after key postpartum events (with t_0 being month of menses return, t_0 being month of exclusive breastfeeding cessation, and t_0 being month of first sex postpartum, separately assessed). We applied lifetable analysis to calculate descriptive statistics including medians and proportions for time to modern contraceptive adoption from each time point. We generated Kaplan Meier curves to investigate differences in failure functions (probabilities of contraceptive uptake) for first use of a modern method (excluding LAM) over the first 12 months postpartum, comparing groups.

We assessed women's understanding of fertility return considering knowledge of LAM and exclusive breastfeeding as proxy indicators. A vignette of a woman named Habiba was utilized to evaluate women's knowledge of LAM criteria. Participants were told "Habiba's baby is 2 months old. She does not want to get pregnant again yet. She would like to use a method called lactational

amenorrhea method, or LAM, to prevent another pregnancy." A series of questions followed that related to factors that might affect Habiba's risk of pregnancy, to assess participant understanding of the requirements of successful LAM practice. We conducted t-tests to evaluate the significance of differences in proportions of women who correctly identified factors influencing LAM efficacy, by study group, adjusting for clustering in the data. We examined differences in women's report of receiving information on breastfeeding from a health provider in the first 12 months postpartum by t-test for proportions, comparing study arms, adjusted for clustering.

We also employed cluster-adjusted t-tests for proportion to assess adherence to LAM criteria by intervention status and transition to another method within the first 12 months postpartum among women who reported LAM. All analyses were done in Stata15.

Ethical clearance

The Johns Hopkins Bloomberg School of Public Health Institutional Review Board, the Kenya Medical Research Institute Ethics Review Committee, and the National Human Research Ethics Committee of Nigeria reviewed and approved of this research. Prior to data collection, written informed consent was obtained from all participants.

Results

Sample characteristics

Table 5.1 presents sociodemographic characteristics of the enrolled sample. No statistical differences existed at enrollment between the group-based ANC and PNC (intervention) or standard of care (control) groups in either site. LTFU from enrollment to 12 months postpartum was 37.7% in Kenya and 18.8% Nigeria. These proportions fall within the anticipated LTFU range per phase in each site, which was accounted for in original sample size calculations. We found no significant differences between study arms in sociodemographic characteristics of women LTFU. Across study arms in both sites, first time mothers were more likely to be LTFU than women with previous deliveries (Kenya $p<0.001$; Nigeria

$p<0.05$). In both arms in Kenya women aged 15-19 were more likely to be LTFU ($p<0.001$), as were unmarried women ($p<0.001$).

Most women in Kenya (69.8% intervention, 74.8% control) and just over a third (30.7% intervention, 43.3% control) in Nigeria had previously used some form of contraception prior to the study. Two women in Kenya (0.3%) and 33 in Nigeria (4.0%), all in the control group, reported previous use of LAM for family planning.

Time to postpartum modern contraceptive uptake

Descriptive statistics and hazard ratios resulting from survival analysis of time to modern contraceptive uptake by intervention status for both study sites are shown in Table 5.2. In both settings, women in the intervention arm had higher rates of contraceptive uptake from delivery through the first 12 months postpartum; however, no statistically significant differences were found. Time to modern contraceptive uptake from cessation of exclusive breastfeeding, menses return, and resumption of sex did not vary between groups in either site. Median durations to these fertility-return events are presented in Appendix 5.1. Overall, in both sites, women in the intervention reported less time between fertility return events and starting a modern contraceptive method, meaning that they had a shorter time period in which they may have been at risk for subsequent pregnancy compared to women in the control arm. During each time period, more women in the intervention arm took up modern contraception, almost always at a higher rate than women in the control group. Figures 5.1 and 5.2 provide Kaplan Meier curves showing probabilities of modern contraceptive uptake across the first 12 months postpartum for each site. In Kenya, probabilities of taking up a modern method were higher for women in the intervention as compared to control arm from 1-11 months postpartum. In Nigeria, uptake probabilities were higher in the intervention arm from 2-4 months and 6-10 months postpartum.

Knowledge of LAM criteria and exclusive breastfeeding

Women's responses to a series of questions following the vignette of Habiba, a woman who "wants to use LAM to prevent another pregnancy," revealed significant differences in understanding of LAM requirements between study arms in both sites (Table 5.3). In Kenya, a significantly higher proportion of women in group versus standard care knew that LAM was only effective in the first 6 months postpartum (84.0% vs. 48.4%, $p<0.05$). More women in group versus standard care in Nigeria correctly indicated all three requirements for effective LAM use (68.2% vs. 22.7%, $p<0.005$). In both settings a higher proportion of women in group as opposed to standard care reported receiving four key pieces of information on breastfeeding from a health provider in the 12 months since delivery: 1) how to use LAM to prevent pregnancy, 2) how to increase milk supply if needed, 3) eating extra food while breastfeeding, and 4) when to introduce fluids and foods other than breastmilk to their infant (Table 5.4) (Kenya: 79.9% vs. 17.5%, $p<0.001$; Nigeria: 82.4% vs. 37.4%, $p<0.01$).

Exclusive breastfeeding practices and rationale

In both settings, a higher proportion of women in the intervention arm practiced exclusive breastfeeding through the first 6 months postpartum, compared to women in the control group. This difference was significant in Kenya (86.9% vs 72.9%, $p<0.005$) but only approached significance in Nigeria (78.6% vs. 62.8%, $p=0.053$). The most commonly cited reasons for withholding food or drink other than breastmilk for an infant's first 6 months were nutrition (Kenya: 74.8% vs 52.6%, $p<0.05$; Nigeria: 80.1% vs. 58.2%, ns), and preventing infections (Kenya: 65.2% vs. 46.5%, ns; Nigeria: 53.7% vs. 41.8%, ns). Women also cited that giving their infant only breast milk will make them 'more intelligent' (Kenya: 16.9% vs. 11.2%, ns; Nigeria: 55.8% vs. 42.0%, ns). More women in group care cited LAM as a reason for exclusive breastfeeding (Kenya: 9.9% vs. 1.3%, ns; Nigeria: 23.0% vs. 17.6%, ns).

Reported LAM use and practices

In total, 27 women in Kenya (7.3% intervention vs. 1.3% control, ns) and 106 women in Nigeria (19.2% vs. 6.0%, ns) reported using LAM for family planning. Of women who reported using LAM in Kenya, most of those in the intervention arm (69.6%) and a quarter of those in the control group met the

criteria for effective use. In Nigeria, roughly half of women who reported LAM use met these criteria (61.7% vs. 48.0%, ns). Appendix 5.2 provides a breakdown of adherence by criteria for each site. Among those who reported LAM use in Kenya, most took up another method within the first 12 months postpartum (87.0% vs. 75.0%, ns). In Nigeria, nearly half of LAM users in the intervention group and a third of those in the control group transitioned to another modern contraceptive method by 12 months postpartum (46.9% vs. 32.0%, ns).

Discussion

Our findings show that women in group ANC and PNC had higher rates of PPFP uptake from delivery through 12 months postpartum and experienced a shorter lag time between key fertility return events and modern contraceptive initiation, compared to women in standard individual ANC and PNC in Kenya and Nigeria, although this difference was not statistically significant. Results suggest that group care may influence women's contraceptive behavior in a way that is protective against short birth-intervals by promoting early modern contraceptive uptake and emphasizing understanding of factors related to fertility return.

Group ANC and PNC had varying degrees of impact on family planning outcomes between sites. This was expected, as Kenya and Nigeria are distinct settings in terms of postpartum mCPR and breastfeeding practices. Our findings on time to PPFP uptake are consistent with previously observed patterns of immediate PPFP becoming a popular option in high mCPR settings and delayed PPFP initiation seen in areas having low mCPR [21]. As noted, Kenya has a higher postpartum CPR compared to Nigeria (36% versus 15% within 0-23 months postpartum) [18]. At the start of the parent cRCT, Kenya possessed a favorable environment for PPFP compared to Nigeria, which had more room for improvement. Because of this, we see greater differences between the intervention and control groups in Nigeria as opposed to Kenya. Most notably, a greater difference in uptake frequency was observed in Nigeria, with 234 women in the intervention (55.6%) and 118 in the control group (28.5%) reporting

modern contraceptive use in the first 12 months postpartum (compared to 238 [76.0%] and 217 [69.1%] respectively in Kenya).

Exclusive breastfeeding is also more common in Kenya compared to Nigeria, with recent national estimates at 61% and 29% respectively [15] [16]. Compared to these estimates, rates of exclusive breastfeeding in our study were much higher among participants across study arms in both settings. This could be due to facility eligibility criteria, as selected facilities may provide more support for breastfeeding than smaller, less resourced clinics. Also, to be recruited, women in this study had to present for ANC at a participating clinic by 24 weeks gestation; women who do not display the same care-seeking behaviors may be less likely to practice exclusive breastfeeding. Our findings of significantly higher rates of exclusive breastfeeding among women in group care in Kenya but not in Nigeria are reflective of the inconclusive evidence on the relationship between group care and breastfeeding practices. While several studies have found a significant relationship between group care and breastfeeding [22] [23] [24] [25] [11], others have not [26] [27] [28].

Despite the majority of Kenyan women practicing exclusive breastfeeding in the first 6 months postpartum, only a small proportion of women in the control group in Kenya (17.5%) reported receiving four key messages on breastfeeding from a health provider in the 12 months since delivery. Women in group care were significantly more likely to receive these messages, with 79.9% reporting receipt of all four messages, and statistically significant differences in proportions of women reporting receiving each message, comparing intervention arms. Proportions were less disparate yet still significant in Nigeria (82.4% vs. 37.4%), indicating that over a third of Nigerian women typically receive these messages despite low rates of exclusive breastfeeding. A recent study in Ghana also found increased breastfeeding knowledge among group ANC participants [29], which translated to higher rates of exclusive breastfeeding among women in group care [11]. In our study, some women in Kenya practiced exclusive breastfeeding without receiving key messages while others in Nigeria received the messages but did not practice. It is therefore unclear how receipt of this information influenced decision-making and

behavior for women in our study. Further research is needed to better understand this relationship and to investigate whether women receive accurate information on breastfeeding from other sources.

Previous literature has shown that the act of breastfeeding, regardless of degree, is often conflated with LAM as a contraceptive method [6]. A recent study in Nigeria found that 22% of postpartum contraceptive users reported practicing LAM to prevent pregnancy [18]; yet, rates of exclusive breastfeeding can be as low as 3.9%, and it is common practice to feed infants water [30] [31]. If used correctly, LAM provides 98% effectiveness for preventing pregnancy in the first 6 months postpartum. However, research shows that in LMICs only 26% of women who report using LAM actually meet the criteria for effective use [6]. Aside from the control group in Kenya, women in our study displayed greater adherence to LAM criteria, with over two-thirds of LAM users in the intervention arm in Kenya and roughly half of all LAM users in Nigeria successfully meeting LAM requirements. These findings imply that adherence to criteria can improve if information is presented through a different model of care (i.e. facilitated group discussions rather than individual clinic appointments). However, more work is needed to better educate women who choose LAM about factors that influence its efficacy, particularly menses return and the 6-month limit.

As women become better informed about fertility return indicators and the rationale for LAM criteria, they are more aware of their risk of pregnancy in the postpartum period. There is currently a dearth of research on women's understanding of postpartum fertility return. To our knowledge, this is the first study examining LAM practices as a proxy for understanding of fertility return indicators among women in LMIC. It is worth noting that women who possess understanding of LAM criteria may be inclined to choose a different, more effective method of family planning such as long-acting contraception. Considering this, it seems favorable to ensure that women understand fertility return and their options for immediate postpartum contraception rather than relying on LAM as the default initial method for women in areas with lower PPFP prevalence. Our findings from Nigeria provide evidence that women in group care have a slightly elevated probability of uptake at 1 and 2 months postpartum,

compared to women in standard care. This indicates that there is demand for immediate PPFP even in an area of low prevalence, and that group care may influence women's practices.

Since the group PNC intervention spanned the first 12 months postpartum, it is essential to consider the timing of group sessions when assessing patterns of contraceptive uptake. Group PNC meetings occurred at 3, 6, 9, and 12 months postpartum. In the Kaplan-Meier curve for Nigeria, we see that modern contraceptive users in the intervention arm had a higher probability of uptake at 3, 6, and 9 months compared to women in standard care. The spike in probability of contraceptive initiation in the intervention arm between 6-10 months postpartum may reflect uptake among LAM users transitioning to another method. In Kenya, women in the intervention as opposed to the control group had a higher probability of early contraceptive initiation at 1 and 2 months postpartum. At 3 months postpartum in Kenya, women in both groups had similar probabilities of uptake, indicating that the first group PNC meeting may have less immediate effect on contraceptive behaviors. Probabilities of modern contraceptive initiation in Kenya increase from 4 through 6 months postpartum, with the largest difference seen at 6 and 7 months. Women in group as opposed to standard care in Kenya continue to have higher probabilities of uptake through 11 months. These patterns demonstrate a cumulative effect of the intervention across the first 12 months postpartum.

Strengths and limitations

The rigorous cRCT design of the parent study was a strength of this research, as was collecting longitudinal data from mid- pregnancy through the first year postpartum. Evaluating calendar data of contraceptive behavior in the first 12 months postpartum as the PNC group meetings occurred revealed a cumulative effect of the intervention as meetings progressed, which we could not have measured with a pre/post analysis.

During the course of this study, health worker strikes forced temporary facility closures across Kenya. Although study staff conducted analyses to confirm that the strike did not influence intervention

implementation, it appears to have contributed to attrition. First time mothers in both settings, and young and/or unmarried women in Kenya were more likely to be lost to follow-up by 12 months postpartum. Findings from our study therefore may not reflect the contraceptive practices or knowledge of fertility return among these groups. More research is needed to better understand how group care may influence outcomes among this subset of women, and to identify ways to improve their retention in care over the first year postpartum.

Also, given that we collected information based on women's recall at 12 months postpartum, recall bias is probable; women may have misreported the timing of contraceptive initiation and fertility return events. We could have avoided this by relying instead on facility-level data on contraceptive services provided during the study period, however, given that women seek these services from a range of providers it would not be feasible to capture all uptake using facility data.

Conclusion

Our findings indicate that ANC and PNC provision in groups rather than to individuals can have a positive influence on PPFP practices including earlier contraceptive initiation. Women in group care demonstrate higher levels of knowledge on fertility return and better adherence to LAM criteria. We therefore recommend implementation of the group care model at facilities in LMIC. This model may be particularly effective in areas having low postpartum mCPR.

Tables and Figures

Table 5.1 Sociodemographic characteristics of sample

Sociodemographic characteristic	Kenya N=1,013 Frequency (%)			Nigeria N=1,075 Frequency (%)		
	Control N=508	Intervention N=505	p-value[1]	Control N=540	Intervention N=535	p-value[1]
Age						
15 – 19	76 (15.0)	94 (18.6)	0.3683	58 (10.7)	47 (8.8)	0.6365
20 – 34	414 (81.5)	384 (76.0)	0.0827	442 (81.9)	453 (84.7)	0.5878
35 +	18 (3.5)	27 (5.3)	0.2551	40 (7.4)	35 (6.5)	0.7971
Religion						
Catholicism	115 (22.6)	133 (26.3)	0.4929	35 (6.5)	67 (12.5)	0.4774
Islam	2 (0.4)	4 (0.8)	0.8307	398 (73.7)	256 (47.9)	0.1348
Protestant	374 (73.6)	343 (67.9)	0.3461	107 (19.8)	207 (38.7)	0.1847
Traditional	14 (2.8)	24 (4.8)	0.8027	0 (0.0)	2 (0.4)	0.1550
Other	3 (0.6)	1 (0.2)	0.3192	0 (0.0)	3 (0.6)	0.7980
Education						
No education/ Primary education/Qur'anic	226 (44.5)	204 (40.4)	0.4805	329 (60.9)	280 (52.3)	0.5138
Secondary/Post-Secondary	282 (55.5)	301 (59.6)		211 (39.1)	255 (47.7)	
Literacy						
Can't read and Write	9 (1.8)	13 (2.6)	0.3809	240 (44.4)	232 (43.4)	0.9259
Can read and write	499 (98.2)	492 (97.4)		300 (55.6)	303 (56.6)	
Marital status						
Never Married, Single/Widowed	91 (17.9)	79 (15.6)	0.4938	2 (0.4)	9 (1.7)	0.4606
Married/ Cohabiting	417 (82.1)	426 (84.4)		538 (99.6)	526 (98.3)	

Parity (previous births)						
0	172 (33.9)	196 (38.8)	0.1805	145 (26.9)	162 (30.3)	0.4388
1	148 (29.1)	142 (28.1)	0.8209	109 (20.2)	111 (20.8)	0.8733
2	105 (20.7)	90 (17.8)	0.4158	101 (18.7)	107 (20.0)	0.5906
3	49 (9.7)	39 (7.7)	0.7306	75 (13.9)	65 (12.2)	0.3969
4 or more	34 (6.7)	38 (7.5)	0.8594	110 (20.4)	90 (16.8)	0.5508
Mode of Transport						
Walk	206 (40.6)	191 (37.8)	0.7526	238 (44.1)	206 (38.5)	0.6610
Public	286 (56.3)	303 (60.0)	0.6512	269 (49.8)	309 (57.8)	0.4524
Personal/other	15 (3.0)	11 (2.2)	0.8662	33 (6.1)	20 (3.7)	0.5971

[1]P-values derived from cluster-adjusted t-test for difference in proportion

Table 5.2 Timing of modern contraceptive uptake postpartum, excluding LAM

Kenya									
Analytical timeframe	**Control N=314**				**Intervention N=313**				**Hazard Ratio [95% Confidence Interval]**
	Uptake frequency	**Incidence rate**	**Median time to uptake in months postpartum (IQR[1])**	**Mean months at risk**	**Uptake frequency**	**Incidence rate**	**Median time to uptake in months postpartum (IQR)**	**Mean months at risk**	
After delivery (postpartum 0-12 months)	217	0.23	3 (2,7)	4.35	238	0.25	3 (2,6)	4.02	1.12 [0.93, 1.34]
After cessation of exclusive breastfeeding	66	0.29	8 (1,6)	3.42	52	0.28	7.5 (4,8)	3.50	0.97 [0.68, 1.40]
After menses return	86	0.26	6 (2,12)	3.90	77	0.28	6 (1,12)	3.52	1.08 [0.79, 1.48]

After resumption of sex	87	0.27	7 (3,7)	3.75	83	0.28	6 (3,7)	3.52	1.08 [0.80, 1.47]
Nigeria									
Analytical timeframe	**Control N=414**				**Intervention N=421**				**Hazard Ratio [95% Confidence Interval]**
	Uptake frequency	**Incidence rate**	**Median time to uptake in months postpartum (IQR)**	**Mean months at risk**	**Uptake frequency**	**Incidence rate**	**Median time to uptake in months postpartum (IQR)**	**Mean months at risk**	
After delivery (postpartum 0-12 months)	118	0.19	4.5 (3,7)	5.25	234	0.20	5 (3,7)	5	1.01 [0.72, 1.60]
After cessation of exclusive breastfeeding	53	0.27	8 (3,8)	3.69	71	0.29	8 (1,6)	3.50	0.97 [0.68, 1.40]
After menses return	28	0.24	7 (4,9)	4.21	63	0.27	7 (3,7)	3.73	1.08 [0.79, 1.48]
After resumption of sex	41	0.26	7 (1,6)	3.85	95	0.25	6 (4,8)	4.05	1.08 [0.80, 1.47]

[1]Interquartile range

Table 5.3 Mother's understanding of the requirements for using the lactational amenorrhea method to prevent pregnancy, reported at 12 months postpartum

Prompt: I'm going to tell you a short story about a woman named Habiba and ask you a few questions about her. Habiba's baby is 2 months old. She does not want to get pregnant again yet. She would like to use a method called lactational amenorrhea method, or LAM, to prevent another pregnancy.							
Question	**Correct Response**	**Kenya**			**Nigeria**		
		Control N=314 N (%)	**Intervention N=313 N (%)**	**Difference in proportion**	**Control N=414 N (%)**	**Intervention N=421 N (%)**	**Difference in proportion**

				(standard error)			(standard error)
Habiba only gives her baby breastmilk but her mother in law also gives the baby water and thin porridge sometimes. To prevent pregnancy, should Habiba choose a different family planning method?	*Yes*	167 (53.18)	253 (80.83)	0.27 (0.14)	150 (36.23)	333 (79.10)	0.43 (0.13)***
Can she continue to use LAM as a family planning method after she sees her first menses/monthly bleeding?	*No*	179 (57.01)	243 (77.64)	0.21 (0.12)	129 (31.16)	335 (79.57)	0.48 (0.13)***
What is the oldest her baby can be before LAM is no longer a good option for Habiba (specify in months)?	*6 months*	152 (48.41)	263 (84.03)	0.36 (0.15)*	212 (51.21)	370 (87.89)	0.37 (0.14)*
Composite (answered all 3 correct):		111 (35.35)	205 (65.50)	0.30 (0.16)	94 (22.71)	287 (68.17)	0.45 (0.14)***

*p<0.05 **p<0.01 ***p<0.005 ****p<0.001

Table 5.4 Mother's reported receipt of information on breastfeeding from a provider within 12-months postpartum

	Kenya			Nigeria		
	Control N=314 N (%)	**Intervention N=313 N (%)**	**Difference in proportion (standard error)**	**Control N=414 N (%)**	**Intervention N=421 N (%)**	**Difference in proportion (standard error)**
How to use breastfeeding to prevent another pregnancy right away, a method called LAM	89 (28.34)	271 (86.58)	0.58 (0.65)****	170 (41.06)	371 (88.12)	0.47 (0.13) ***
How to increase your milk supply if needed	115 (49.36)	277 (88.50)	0.39 (0.11)****	234 (56.52)	373 (88.60)	0.32 (0.14)*
Eating extra food while breastfeeding	220 (70.06)	302 (96.49)	0.26 (0.08)***	322 (77.78)	406 (96.44)	0.19 (0.10)
When to introduce fluids and foods other than breast milk to your baby	270 (85.99)	305 (97.44)	0.11 (0.05)*	345 (83.33)	400 (95.01)	0.12 (0.08)
Composite (answered "yes" to receipt of all information):	55 (17.52)	250 (79.87)	0.62 (0.06)****	155 (37.44)	347 (82.42)	0.45 (0.17)**

*p<0.05 **p<0.01 ***p<0.005 ****p<0.001

Figure 5.1 Kaplan Meier curve showing probability and time to uptake of modern contraception, Kenya

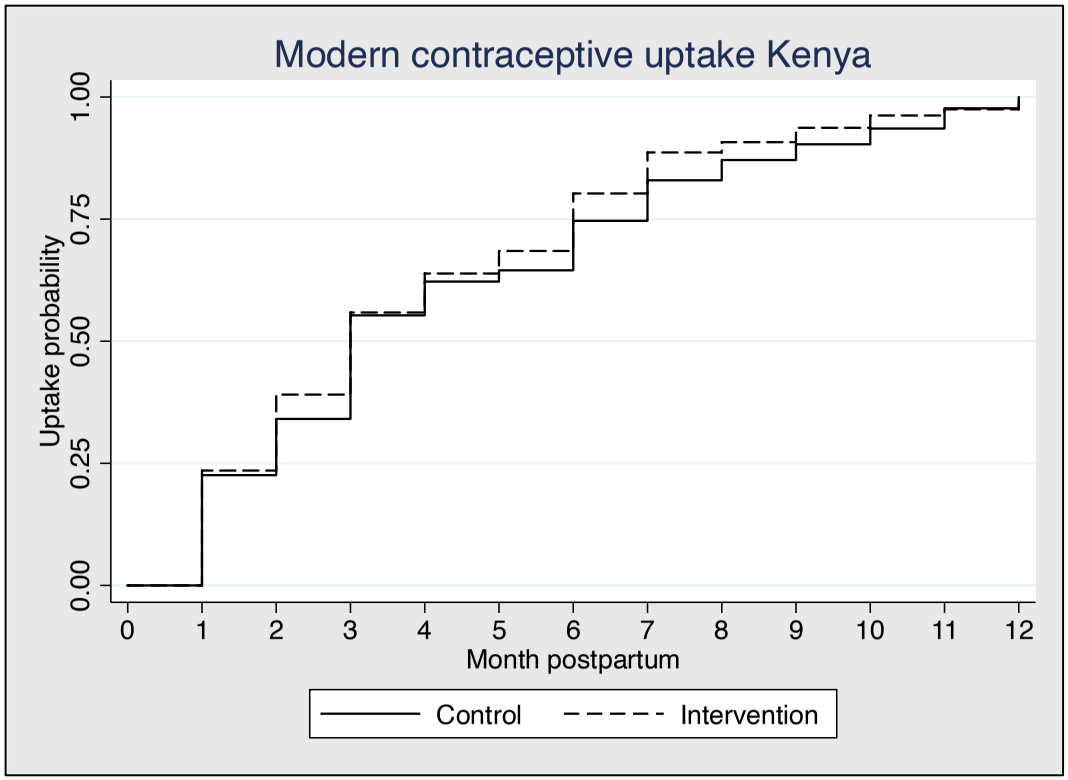
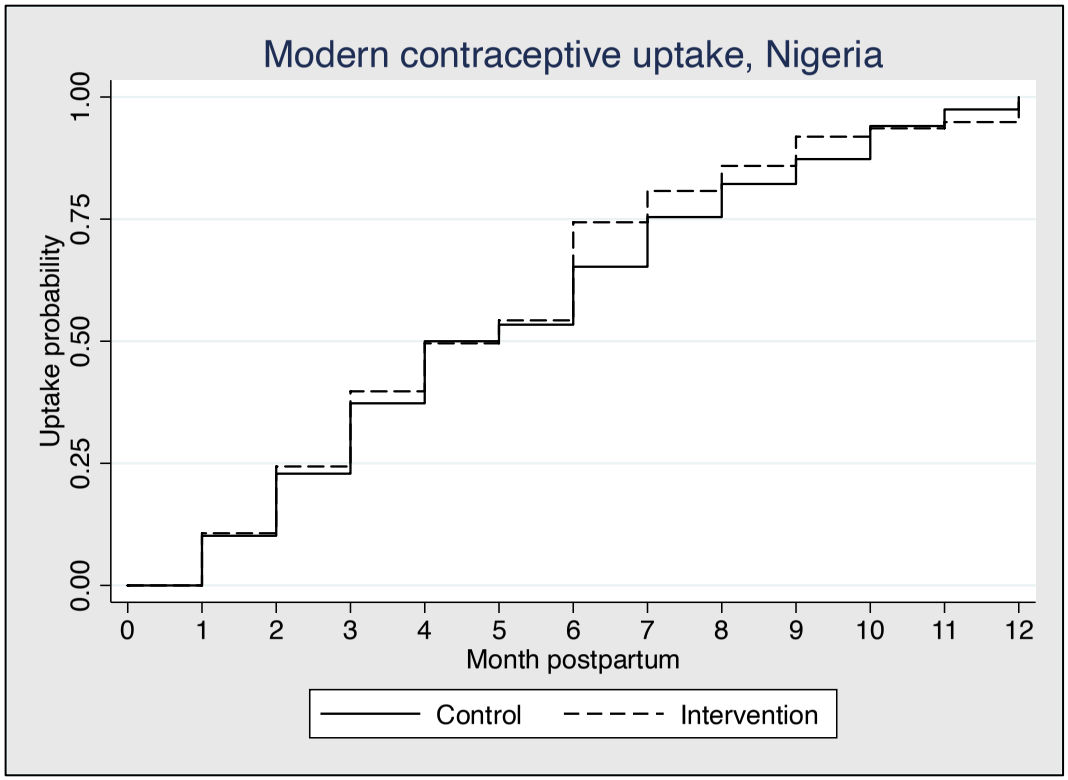


Figure 5.2 Kaplan Meier curve showing probability and time to uptake of modern contraception, Nigeria



Appendices

Appendix 5.1 Median duration of key indicators for fertility return in first year postpartum among women in standard versus group care, Kenya and Nigeria

Return to fertility indicator	Kenya Median duration in months postpartum (Interquartile range)		Nigeria Median duration in months postpartum (Interquartile range)	
	Control	Intervention	Control	Intervention
Postpartum abstinence	3 (2, 5)	3 (2, 5)	4 (2, 8)	3 (2, 6)
Postpartum amenorrhea	4 (2, 12)	6 (2, 12)	11 (6, 12)	10 (4, 12)
Exclusive breastfeeding	6 (5, 6)	6 (6, 6)	6 (3, 6)	6 (6, 6)

Appendix 5.2 Adherence to criterion for using lactational amenorrhea method to prevent pregnancy, among women reporting this method in Kenya and Nigeria

Lactational amenorrhea method criterion	Kenya			Nigeria		
	Control n=4 n (%)	Intervention n=23 n (%)	Difference in proportion (standard error)	Control n=25 n (%)	Intervention n=81 n (%)	Difference in proportion (standard error)
Exclusively breastfeeding	3 (75.00)	20 (86.96)	0.12 (0.30)	20 (80.00)	63 (77.78)	0.02 (0.09)
Menses not yet returned	1 (25.00)	16 (69.57)	0.45 (0.24)	18 (72.00)	58 (71.60)	0.004 (0.10)
Stopped using within 6 months postpartum	3 (75.00)	20 (86.96)	0.12 (0.30)	16 (64.00)	68 (83.95)	0.20 (0.16)
Composite measure for adherence to all 3 criteria:	1 (25.00)	16 (69.57)	0.45 (0.24)	12 (48.00)	50 (61.73)	0.14 (0.11)

*No significant differences in proportion found between study arms in either site

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Chapter 6. (Paper 3) Measuring contraceptive self-efficacy in sub-Saharan Africa: development and validation of the CSESSA scale in Kenya and Nigeria

Abstract

Objective

Contraceptive self-efficacy, a women's belief about her own ability to complete the actions necessary for successful family planning, is a well-documented determinant of contraceptive use. However, there is currently no validated measure appropriate for low-resource settings. We developed and tested a new scale to measure Contraceptive Self-Efficacy among women in sub-Saharan Africa (CSESSA) using samples in Kenya and Nigeria.

Study Design

The CSESSA scale was administered to women in Kenya (n=314) and Nigeria (n=414). Reliability and validity were analyzed separately by setting. Validity analysis included assessment of the area under the curve (AUC) to demonstrate predictive capability of CSESSA score for contraceptive use. Logistic regression was employed to test the relationship between CSESSA score and contraceptive use.

Results

Item reduction resulted in 11-items in Kenya (α= 0.90) and 10-items in Nigeria (α=0.93). Three domains of contraceptive self-efficacy emerged in both settings: 1) husband/partner communication, 2) provider communication, and 3) choosing and managing a method. Items related to the first two subscales, but not the third, were identical across settings. The AUC indicated predictive capability as mild in Kenya (AUC=0.58) and strong in Nigeria (AUC=0.73). In both settings, CSESSA score was associated with use of a modern contraceptive method at 12-months postpartum.

Conclusions

The CSESSA scale is a reliable and valid measure in two countries. Variation of the third subscale by site indicates that certain scale items may be more relevant in areas of low-versus high contraceptive prevalence. Further research should be done to validate this subscale in other contexts.

Introduction

Theories of self-efficacy link an individual's beliefs about their personal capabilities to their health behaviors, and evidence indicates that practices that promote self-efficacy influence behavior change [1]. Contraceptive self-efficacy (CSE) is a woman's belief in her own ability to succeed in contraceptive initiation, management, and continued use. Despite being a recognized precursor to effective contraceptive uptake [2] [3] [4] [5], CSE is not routinely measured in low-resource settings. Most efforts to measure contraceptive-related self-efficacy have been restricted to high-resource settings [2] [3].

Levinson developed a scale to measure CSE among adolescents in high-income contexts which has been validated in a variety of settings across the US, Canada, and Mexico [2] [3]. Most items in Levinson's scale are not relevant to non-adolescent women in low-resource settings. There are validated scales to measure self-efficacy for condom use, sexual communication, and protective sexual behaviors [6] [7] [8] [9]; yet, there is currently no appropriate standardized tool to measure CSE in low-resource settings such as sub-Saharan Africa (SSA).

A validated measure of CSE for a low-resource context would strengthen contraceptive research and could be used to develop, evaluate, and improve contraceptive promotion efforts. Responses to items on a CSE scale could identify specific behaviors for which women have low self-efficacy that can be addressed by activities to promote contraceptive adoption and use. Exploring CSE levels over time could lend insight to factors that influence CSE and how CSE may mediate contraceptive behavior.

We developed a new scale aiming to measure Contraceptive Self-Efficacy among women in sub-Saharan Africa (CSESSA). This paper presents findings from reliability analysis and validation of the CSESSA scale in two independent samples of women in Kenya and Nigeria.

Methods

Scale Development

We assessed the transferability of Levinson's CSE scale to the SSA context through conversations with co-investigators and reproductive health program staff in Kenya and Nigeria. Concepts underlying certain scale items, such as partner communication and seeking contraception from a health provider, were selected for inclusion based on relevance to the target population. Findings from focus group discussions with women of reproductive age (WRA) in Nigeria informed item development. Bandura's theory on self-efficacy guided item phrasing. Iterations of scale items were reviewed and revised by the authors with in-country colleagues and remotely by a group of reproductive health experts. The resulting 21-items were pilot-tested among 8 postpartum women attending health clinics in Kenya. Revisions were made, and three double-barreled items were removed. Eighteen items remained for scale development (Appendix 6.A).

Participants

The final version of the CSESSA scale was administered to women participating in a cluster randomized trial of group-based compared to standard antenatal and postnatal care in Kisumu and Machakos counties, Kenya and Nasarawa State, Nigeria. Kisumu is located in Western Kenya on Lake Victoria, and Machakos borders Nairobi. In both Kenya counties, nearly all pregnant women receive antenatal care (ANC) from a skilled provider, and the modern contraceptive prevalence rate (mCPR) is higher than the national average (59% in Kisumu and 68% in Machakos, compared to 53% nationally) [10]. In Nasarawa, a diverse, under-resourced state in central Nigeria, 77.1% of pregnant women receive

ANC from a skilled provider [11]. The mCPR is slightly higher in Nasarawa State compared to Nigeria overall (14.3% compared to 12.0% nationally) [11].

Inclusion criteria and study methods for the cluster randomized trial are detailed elsewhere [12]. The present analysis uses cross-sectional data from a survey administered at the end of the study to participants who were 12-months postpartum. To remove any potential effect of the intervention (group-based care) on CSE, data are constrained to participants in control facilities only.

The sample is further limited to women who attended at least one ANC visit before 24 weeks gestation, consented to participate in the study, and were available for follow-up one-year after delivery. Women whose infants died before 12-months postpartum are excluded from analysis (n=1 Kenya, 20 Nigeria). Data collection was completed in July 2018 in Kenya and March 2018 in Nigeria.

Procedures

Study staff contacted participants by phone or in-person to schedule the 12-month postpartum survey. The survey was then administered to participants in their homes by Research Assistants (RAs) using *RedCap* mobile technology to upload data remotely from a tablet to a secure server. All questions were read aloud to participants. For the CSESSA scale, the RAs asked women to rate the certainty with which they could do each item (for example, *discuss family size with my husband/partner*). A visual analogue scale was used as an aide to describe the response options, which ranged from 0 (*cannot do at all*) to 10 (*highly certain can do*). As needed, RAs asked participants to clarify a response falling between two tick marks and recorded the value closest to the point on the line indicated by the participant.

The survey also collected information on participants' sociodemographic characteristics and contraceptive behaviors. An indicator of household wealth was generated based on methods used by the Demographic Health Survey [13]. Women were considered to be current modern contraceptive users if they responded positively to the question "Are you currently using a family planning method to prevent

pregnancy?" and reported current use of condoms, oral contraceptive pills, injectables, implant, intrauterine device, emergency contraception, or sterilization.

Sample description

The samples in both settings surpassed the size required by the ratio of subject-to-item guidelines of 10 subjects per item and demonstrated 100% response rates for each item. Demographic characteristics and number of study participants are provided in Table 6.1. Differences are notable between settings. While most women in the Kenyan sample (73.6%) were Protestant and almost all (98.1%) were literate, women in the Nigerian sample were predominantly Muslim (73.9%) and just over half (56.8%) were literate. Most women in Kenya recently delivered their first or second child (59.9% vs. 46.4% in Nigeria), while over a third of the Nigerian sample recently delivered their fourth or fifth child (35.2% vs. 19.4% in Kenya). Modern contraceptive use at 12-months postpartum was high in Kenya (73.3%) and low in Nigeria (27.5%).

Ethical clearance

This study was reviewed and approved by the Johns Hopkins Bloomberg School of Public Health Institutional Review Board, the Kenya Medical Research Institute Ethics Review Committee, and the National Human Research Ethics Committee of Nigeria. Written informed consent was obtained from all participants prior to data collection.

Analysis

We conducted psychometric analyses to assess the reliability, fit, and structure of the 18-item scale independently in each setting. The reliability coefficients were high both in Kenya (Cronbach's alpha (α)=0.93) and Nigeria (α=0.97). To remove redundant and poor-fitting scale items, we assessed item-test and item-rest correlations and factor loadings derived from principle components analysis (PCA). Items having item-test or item-rest correlation <0.60 were removed. Items were retained if their greatest factor loading was >0.60 and second highest was <0.30. Items with uniqueness above 0.50 were

removed, leaving a total of 13 items remaining for further analysis across sites (retained items presented in Table 2). Of these 13 items, 8 were consistent across sites. Some items that were retained in Kenya were removed in Nigeria (n=3) or kept in Nigeria but not Kenya (n=2).

Internal consistency of the scale with 11 items in Kenya and 10 items in Nigeria was re-assessed by Cronbach's alpha. PCA was then performed to determine whether four hypothesized domains presented as factors. Three factors produced eigenvalues above 1. These were extracted through exploratory factor analysis using promax rotation and retained as the following scale domains: husband/partner communication, provider communication, and choosing and managing a method.

Reliability analysis was conducted to assess the potential of subscales by domain. Items for husband/partner communication and provider communication were identical in both settings. However, items related to choosing and managing a method varied, signaling that this domain may manifest differently in areas with low and high contraceptive prevalence (see Appendix 6.B). Mean scores for each domain were calculated and compared across age, education, parity, and household wealth by t-tests.

Validity of the scale was then assessed separately for both samples (see Appendix 6.C). We calculated the area under the curve (AUC) of a receiver operating characteristic (ROC) curve to assess the predictive capability of the mean CSESSA score against current modern contraceptive use (criterion-related validity) [14] [15]. Construct validity was assessed through logistic regression of the total CSESSA score against current modern contraceptive use [14]. Generalized estimating equation was used to account for clustering of data at the health facility level (10 clusters per site) [16]. All data were analyzed in Stata15.

Results

Kenya

Reliability

Reliability analysis of the 11-item scale in Kenya produced a Cronbach's alpha of 0.90 and average inter-item correlation (IIC) of 0.49, signifying a reliable measure. On a single-factor solution, the item *Obtain the method of family planning I want, if I want one* loaded highest. Three potential subscales were identified based on factor loadings (organized according to domain in Table 6.3). Reliability analysis for a husband/partner communication subscale returned a strong Cronbach's alpha of 0.89 and high IIC of 0.68. The reliability indicators for a provider communication subscale and a scale for choosing and managing a method were similarly strong (α=0.89, IIC 0.68; α=0.88, IIC 0.71 respectively).

The 11-item CSESSA scale total scores ranged from 0-110 points, with a standardized (0-10) mean of 8.72 and standard deviation (sd) of 1.72. Percent distribution of mean scores for the Kenya sample were highly skewed. Mean responses were high across domains: 8.24 (sd 2.57) for husband/partner communication, 8.98 (sd 1.73) for provider communication, and 9.02 (sd 1.84) for choosing and managing a method. Mean scores by demographic characteristic are shown in Table 6.4.

Validity

As shown in Figure 6.1, the AUC of 0.58 suggests that while a woman's mean score on the CSESSA in Kenya may predict her willingness to use modern contraception, more investigation into this relationship is required. Each of the three potential subscales produced a similar result with AUC ranging from 0.51- 0.58 (Figure 6.2).

Results of multivariate logistic regression indicate a valid measure: for each one-point increase in the CSESSA total score the odds of current modern contraceptive use increased by 4.0% (aOR 1.04, p<0.001 [CI 1.02, 1.06]) controlling for age, language, religion, education, parity, and household wealth. This same relationship held when the standardized mean CSESSA score was split into quartiles (aOR 1.54, p<0.050 [CI 1.11, 2.15]), controlling for the same variables. We ran the same model to assess the

relationships of each subscale to current modern contraceptive use. The total score from each subscale was significantly associated with the outcome as shown in Table 6.5.

Nigeria

Reliability

Assessment of internal consistency for the 10-item scale in Nigeria indicated strong reliability (α=0.93, IIC 0.56). On a single-factor solution, the item *Discuss specific family planning methods with my husband/partner* loaded highest. Analysis of potential subscales by domain showed strong reliability but moderately high IIC. For husband/partner communication, the Cronbach's alpha was 0.94 with IIC of 0.79; provider communication returned a Cronbach's alpha of 0.95 and IIC of 0.87; and choosing and managing a method showed a Cronbach's alpha of 0.93 and IIC of 0.82. For the full scale, the standardized (0-10) mean score was 6.61 (sd 2.55). Mean responses by domain were: 5.54 (sd 3.32) for husband/partner communication, 8.05 (sd 2.34) for provider communication, and 6.60 (sd 3.38) for choosing and managing a method.

Validity

The AUC of 0.73 (0.03) indicates that a woman's mean score on the CSESSA in Nigeria has a strong predictive capability for modern contraceptive use (Figure 6.1). Similarly, all three subscales were highly predictive of current modern contraceptive use, with AUC above 0.67 (Figure 6.2).

In the Nigeria sample, each one-point increase in CSESSA total score (0-100) increased the odds of current modern contraceptive use by 6.0% (aOR 1.06, p<0.001 [CI 1.05, 1.08]) controlling for age, language, religion, education, parity, and household wealth. In the same model, each progressive quartile of the standardized mean CSESSA score increased the odds of current modern contraceptive use 3.02 times (aOR 3.02, p<0.001 [CI 2.23, 4.09]). In separate multivariate regressions each subscale total score was significantly associated with current modern contraceptive use (Table 6.5).

Discussion

This paper contributes a reliable, validated measure for CSE in two low-resource African countries. While the full scale provides a multifaceted and comprehensive measure of CSE, subscales allow researchers to focus on specific aspects of CSE using fewer items. The three scale domains align with factors identified in the literature as having influence on contraceptive use in SSA [17] [18] [19]. Establishing scale reliability and validity in two distinct settings is a strength of this study; however, confirmatory analyses should be done to validate both 'choosing and managing a method' subscale options in low and high mCPR settings.

In assessment of criterion-related validity, the AUC in Kenya fell just below our cut-off point (0.60), however, regression results show a strong relationship between CSESSA score and current modern contraceptive use. These findings indicate that either current modern contraceptive use may not be an appropriate "gold standard" measure for CSE, or that CSE may not serve in a predictive capacity for modern contraceptive use in this context. In contrast, validity results were consistently strong in Nigeria.

The CSESSA scale and subscales can be used in contraceptive research and programming to target key intervention opportunities and to evaluate program effectiveness. Assessing mean scores by subscale and demographics can help to identify those who need contraceptive care support. For example, women with lower education in Nigeria may need more support to communicate with their husband/partner about contraception. Findings related to influence of age [20] [21] [22], education [18] [21] [22], and wealth [21] [22] on CSE are consistent with literature on these factors' influence on contraceptive uptake. Additional research should be done to assess how prior contraceptive use influences women's CSE and the measure's relation to contraceptive discontinuation.

The mCPR in both sample populations is higher than national estimates (Kenya: 73.3% vs. 53.0%; Nigeria: 27.5% vs. 12.0% nationally) [10] [11]. Given the eligibility criteria for the parent study, these samples may represent a specific subset of women who have higher care-seeking behavior, likelihood of using contraception, and CSE compared to women who were not recruited.

This study has several limitations. First, the fact that the scale was included in a postpartum survey is restrictive and results in a homogeneous sample in terms of variation in reproductive experiences, health system interactions, preferences, and partner-status. Items pertaining to husband/partner communication may be less relevant to women at various stages of life and in different settings. This homogeneity may contribute to high IICs, particularly in Nigeria. In addition, the cross-sectional nature of administration is not ideal. Preferably, the scale would be administered at multiple time points to gauge whether levels of CSE fluctuate or hold constant relative to an intervention.

Lastly, in the Kenyan sample, the distribution is heavily skewed toward high scores. This likely is a reflection of Kenya's high mCPR, however, it is also possible that desirability bias or survey fatigue contributed to consistently high scores.

Conclusions

The CSESSA scale appears to be a reliable, valid measure of CSE for women in both Kenya and Nigeria.

Tables, Figures, and Appendices

Table 6.1 Demographic characteristics of study participants

Total	**Kenya N=314**	**Nigeria N= 414**
	Frequency (%)	**Frequency (%)**
Primary language spoken		
English	39 (12.4)	80 (19.3)
Kiswahili	103 (32.8)	-
Hausa	-	334 (80.7)
Luo	113 (36.0)	-
Kamba	56 (17.8)	-
Other	3 (1.0)	-
Age		
15 – 19	43 (13.7)	46 (11.1)
20 – 24	106 (33.8)	153 (37.0)
25 – 29	98 (31.2)	116 (28.0)
30 – 34	54 (17.2)	68 (16.4)
35 +	13 (4.1)	31 (7.5)
Religion		
Catholicism	73 (23.3)	23 (5.6)
Islam	2 (0.6)	306 (73.9)
Protestant	231 (73.6)	85 (20.5)
Traditional	6 (1.9)	-
Other	2 (0.6)	-
Education		
No education/ Primary education/Qur'anic	149 (47.5)	253 (61.1)
Secondary/Post-Secondary	165 (52.6)	161 (38.9)
Literacy		
Can't read and Write	6 (1.9)	179 (43.2)
Can read and write	308 (98.1)	235 (56.8)
Marriage		
Never Married, Single/Widowed	46 (14.7)	1 (0.2)
Married/ Cohabiting	268 (85.4)	413 (99.8)
Parity		
1	91 (29.0)	103 (24.9)
2	97 (30.9)	89 (21.5)
3	65 (20.7)	76 (18.4)
4	35 (11.2)	56 (13.5)
5 or more	26 (8.2)	90 (21.7)
Mode of Transport		
Walk	124 (39.5)	182 (44.0)

Public	180 (57.3)	201 (48.5)
Personal/other	10 (3.2)	31 (7.5)
Household Wealth		
Lowest	83 (26.4)	129 (31.2)
Low	89 (28.3)	88 (21.3)
High	85 (27.1)	102 (24.6)
Highest	57 (18.2)	95 (22.9)
Modern contraceptive use at 12 months postpartum		
Yes	230 (73.3)	114 (27.5)
No	84 (26.7)	300 (72.5)

Table 6.2 Retained Items*, Contraceptive Self-Efficacy Scale for Sub-Saharan Africa, Kenya and Nigeria

Stem	Items	Kenyan Scale	Nigerian Scale	Response Options
How certain you are that you can…	1. Discuss family size with my husband/partner	X	X	0 *Cannot do at all* to 10 *Highly certain can do*
	2. Discuss if and when I'd like to get pregnant again with my husband/partner	X	X	
	3. Discuss specific family planning methods with my husband/partner	X	X	
	4. Reach an agreement with my husband/partner about use of family planning that takes my desires into account	X	X	
	5. Bring up the topic of family planning with a health care provider	X	X	
	6. Ask a provider to clarify something they have told me about family planning if I'm not sure I understand	X	X	
	7. Tell a provider what's important to me in choosing a family planning method	X	X	
	8. Choose a family planning method that will work well for me	X		
	9. Obtain the method of family planning I want, if I want one	X	X	
	10. Obtain a different method of family planning if the one I want isn't available		X	
	11. Find solutions to bothersome side effects from family planning or switch methods if needed because of bothersome side effects	X		
	12. Use a family planning method according to instructions to prevent pregnancy	X		
	13. Stop using family planning and get pregnant again if/when I want to		X	

*The following items were removed during analysis: Ask my husband/partner to use a condom if I want him to; Start a family planning method if my friends and family might find out; Continue a family planning method if my friends and family found out; Ask a provider questions I have about family planning methods; Have some control over if and when I get pregnant again

Table 6.3 Rotated Factor Loadings for CSESSA Scale Items by domain: Kenya and Nigeria

	Kenya n=314				Nigeria n=414			
Item	Husband/partner communication	Provider communication	Choosing and managing a method	Uniqueness	Husband/partner communication	Provider communication	Choosing and managing a method	Uniqueness
Discuss family size with my husband/partner	0.8990	-0.0713	0.0220	0.2293	0.7793	0.0557	0.0370	0.3123
Discuss if and when I'd like to get pregnant again with my husband/partner	0.9014	0.0147	-0.0867	0.2442	0.8162	0.0281	0.0319	0.2791
Discuss specific family planning methods with my husband/partner	0.7382	0.0852	0.0236	0.3687	0.9640	-0.0066	-0.0276	0.1073
Reach an agreement with my husband/partner about use of family planning that takes my desires into account	0.6645	0.0396	0.1407	0.4152	0.9062	-0.0342	0.0535	0.1466
Bring up the topic of family planning with a health care provider	0.0030	0.7966	0.0285	0.3334	0.0257	0.8602	0.0646	0.1776
Ask a provider to clarify something they have told me about family planning if I'm not sure I understand	-0.0119	0.7699	0.1693	0.2232	-0.0086	0.9917	-0.0240	0.0473

Tell a provider what's important to me in choosing a family planning method	0.0224	0.8154	0.0214	0.2943	-0.0035	0.9258	0.0011	0.1447
Choose a family planning method that will work well for me	0.0001	0.0594	0.7941	0.3057	-	-	-	-
Obtain the method of family planning I want, if I want one	-0.0402	0.0595	0.8594	0.2268	0.1977	0.0697	0.6818	0.2697
Obtain a different method of family planning if the one I want isn't available	-	-	-	-	-0.0147	0.0117	0.9721	0.0605
Find solutions to bothersome side effects from family planning or switch methods if needed because of bothersome side effects	0.0618	0.0841	0.7499	0.2971	-	-	-	-
Use a family planning method according to instructions to prevent pregnancy	0.0120	-0.0094	0.8493	0.2790	-	-	-	-
Stop using family planning and get pregnant again if/when I want to	-	-	-	-	0.0014	-0.0130	0.9288	0.1477

Table 6.4 CSESSA mean scores by age, education, parity, facility location, and household wealth

	Kenya				Nigeria			
	Full CSESSA scale	Husband/partner communication	Provider communication	Choosing and managing a method	Full CSESSA scale	Husband/partner communication	Provider communication	Choosing and managing a method
Mean (Standard Deviation) [Interquartile Range]	8.72 (1.72) [1.82]	8.24 (2.57) [2.50]	8.98 (1.73) [1.33]	9.02 (1.84) [1.25]	6.61 (2.55) [4.00]	5.53 (3.32) [5.75]	8.05 (2.34) [3.33]	6.60 (3.38) [5.67]
Age								
15 –24	8.49 (2.03)*	7.97 (2.90)	8.68 (2.02)***	8.86 (1.94)	6.73 (2.56)	5.65 (3.42)	8.17 (2.32)	6.73 (3.33)
25 +	8.94 (1.36)	8.47 (2.22)	9.26 (1.38)	9.17 (1.74)	6.50 (2.54)	5.43 (3.23)	7.94 (2.36)	6.49 (3.44)
Education								
No education/ Primary education/Qur'anic	8.54 (1.88)	8.05 (2.67)	8.93 (1.82)	8.74 (2.16)**	6.46 (2.66)	5.04 (3.47)***	8.09 (2.39)	6.72 (3.44)
Secondary/Post-Secondary	8.89 (1.55)	8.40 (2.48)	9.04 (1.65)	9.27 (1.47)	6.85 (2.37)	6.32 (5.87)	7.98 (2.26)	6.43 (3.28)
Parity								
First birth	8.52 (1.83)	7.89 (2.92)	8.72 (1.83)	8.99 (1.61)	6.59 (2.60)	5.70 (3.25)	7.97 (2.50	6.39 (3.41)
Had previous birth	8.81 (1.67)	8.37 (2.41)	9.09 (1.68)	9.03 (1.93)	6.62 (2.54)	5.48 (3.34)	8.07 (2.29)	6.68 (3.38)
Household Wealth								
Lowest - Low	8.66 (1.83)	8.10 (7.78)	9.02 (1.71)	8.95 (1.97)	6.47 (2.78)	5.14 (3.56)*	8.27 (2.52)*	6.43 (3.64)
High- Highest	8.86 (1.45)	8.51 (2.06)	8.91 (1.79)	9.16 (1.53)	6.77 (2.27)	5.98 (2.98)	7.80 (2.07)	6.80 (3.07)

*p <0.05, **p<0.01, ***p<0.005

Table 6.5 Multivariate logistic regressions* of CSESSA total and sub-scale scores against current modern contraceptive use, Kenya and Nigeria

Scale	Odds Ratio**	p-value	95% Confidence Interval
Kenya			
Total CSESSA score (110 points)	1.04	<0.001	1.02, 1.06
Total score for each sub-scale			
Husband/partner communication (40 points)	1.06	<0.001	1.03, 1.09
Provider communication (30 points)	1.08	<0.005	1.02, 1.13
Choosing and managing a method (30 points)	1.09	<0.001	1.05, 1.13
Nigeria			
Total CSESSA score (100 points)	1.06	<0.001	1.05, 1.08
Total score for each sub-scale			
Husband/partner communication (40 points)	1.10	<0.001	1.07, 1.12
Provider communication (30 points)	1.18	<0.001	1.11, 1.25
Choosing and managing a method (30 points)	1.16	<0.001	1.11, 1.20

*A separate regression was run for each scale and sub-scale with the outcome of current modern contraceptive use; each controlled for age, language, religion, education, parity, and household wealth.

** Odds ratios reflect the difference in odds of using modern contraception for each one-point increase in total score

Figure 6.1 Area under the receiver operating characteristic curve for total CSESSA score as a predictor of modern contraceptive use, Kenya and Nigeria

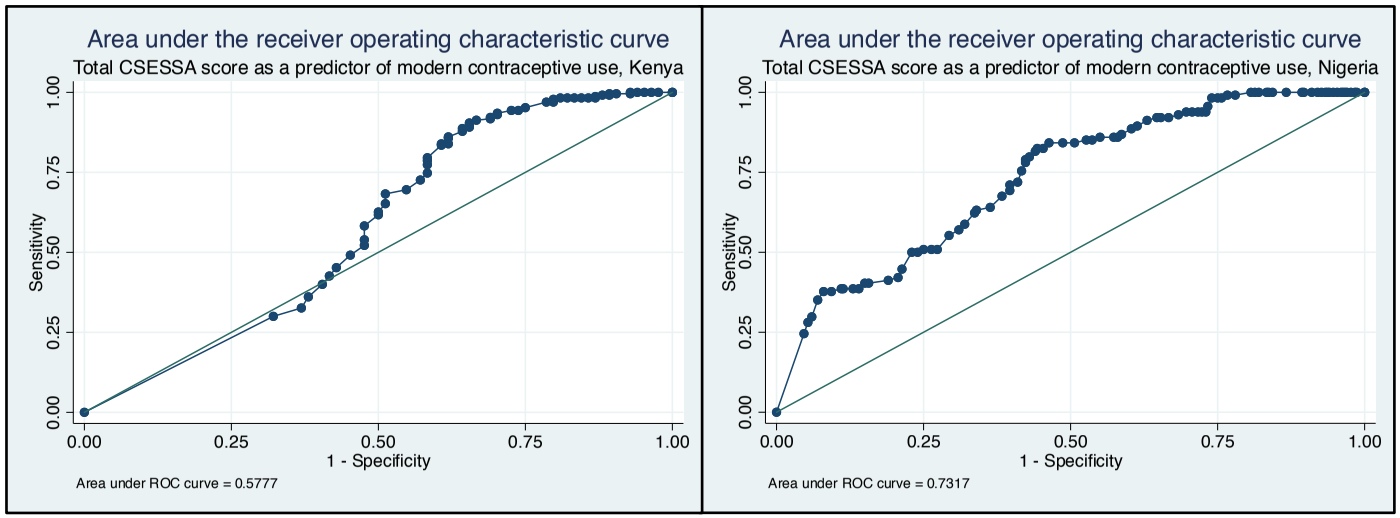
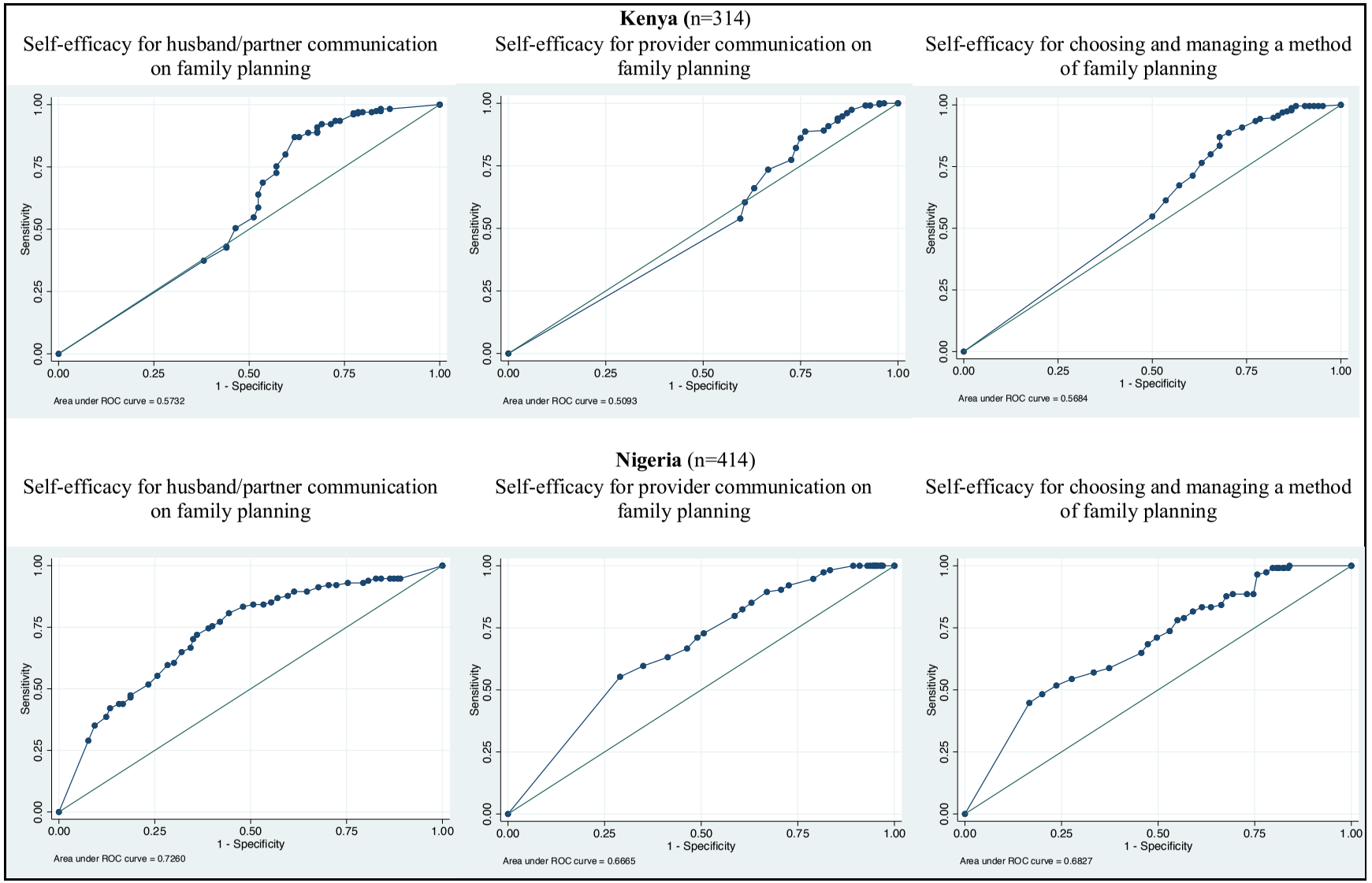


Figure 6.2 Area under the receiver operating characteristic curves for each CSESSA sub-scale as a predictor of modern contraceptive use, Kenya and Nigeria



Appendices

Appendix 6.A

Original 18 item Scale

1. Discuss family size with my husband/partner
2. Discuss if and when I'd like to get pregnant again with my husband/partner
3. Discuss specific family planning methods with my husband/partner
4. Ask my husband/partner to use a condom if I want him to
5. Reach an agreement with my husband/partner about use of family planning that takes my desires into account
6. Start a family planning method if my friends and family might find out
7. Continue a family planning method if my friends and family found out
8. Bring up the topic of family planning with a health care provider
9. Ask a provider questions I have about family planning methods
10. Ask a provider to clarify something they have told me about family planning if I'm not sure I understand
11. Tell a provider what's important to me in choosing a family planning method
12. Have some control over if and when I get pregnant again
13. Choose a family planning method that will work well for me
14. Obtain the method of family planning I want, if I want one
15. Obtain a different method of family planning if the one I want isn't available
16. Find solutions to bothersome side effects from family planning or switch methods if needed because of bothersome side effects
17. Use a family planning method according to instructions to prevent pregnancy
18. Stop using family planning and get pregnant again if/when I want to

Appendix 6.B

The CSESSA scale comprises of three sub-scales: Self-efficacy for husband/partner communication on family planning, Self-efficacy for provider communication on family planning, and Self-efficacy for choosing and managing a method of family planning. The latter sub-scale has two options for the researcher to select from depending on the contraceptive prevalence of their study setting. When measuring contraceptive self-efficacy, all three sub-scales are to be used together in the following order.

Self-efficacy for husband/partner communication on family planning

1. Discuss family size with my husband/partner
2. Discuss if and when I'd like to get pregnant again with my husband/partner
3. Discuss specific family planning methods with my husband/partner
4. Reach an agreement with my husband/partner about use of family planning that takes my desires into account

Self-efficacy for provider communication on family planning

1. Bring up the topic of family planning with a health care provider
2. Ask a provider to clarify something they have told me about family planning if I'm not sure I understand
3. Tell a provider what's important to me in choosing a family planning method

Self-efficacy for choosing and managing a method of family planning (choose appropriate sub-scale from below)

Use in a low mCPR setting

1. Obtain the method of family planning I want, if I want one
2. Obtain a different method of family planning if the one I want isn't available
3. Stop using family planning and get pregnant again if/when I want to

Use in a high mCPR setting

1. Choose a family planning method that will work well for me
2. Obtain the method of family planning I want, if I want one
3. Find solutions to bothersome side effects from family planning or switch methods if needed because of bothersome side effects
4. Use a family planning method according to instructions to prevent pregnancy

Appendix 6.C

Details on validation methods

Criterion-related validity, which represents the empirical association between the scale and an external criterion, often referred to as the "gold standard" [14] was explored via the area under the curve (AUC) of a receiver operating characteristic (ROC) curve. The AUC is a summary measure of diagnostic performance ranging from 0 to 1 and provides the average sensitivity value for all possible specificity values. As the AUC approaches 1, the diagnostic performance of a test improves [15]. We calculated the AUC for a ROC to assess the predictive capability of the mean CSESSA score against current modern contraceptive use. Criterion-related validity was considered to be established if the AUC was greater than 0.60. Construct validity, the extent to which a measure performs as one would anticipate in relation to established measures of other related constructs [14], was assessed through logistic regression of the total CSESSA score against current modern contraceptive use.

If we were to strictly assess the scale by language, the subject-to-item ratio allows for scale validation in Kiswahili and Luo in Kenya, and Hausa in Nigeria. From this standpoint, sample size is lacking in English (both sites) and Kamba (Kenya), although findings signal that the scale works well consistently across these languages. Results from multivariate regression in both settings showed participant language to be non-significant, indicating that a woman's score was associated with modern contraceptive use regardless of language.

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Chapter 7. Conclusion

Strengths and Limitations

Strengths

This dissertation research fill gaps in understanding of how an alternative model of antenatal and postnatal care delivery may influence women's postpartum contraceptive behaviors. To date, research on group care in LMIC has focused on feasibility and acceptability of the group care model across settings [1] [2] [3] [4]. Just recently, researchers have begun to assess health outcomes of women who attend group care in LMICs, and report mixed yet promising results for uptake in facility-based delivery, ANC attendance, and PPFP [5] [6] [7] [8] [9]. With the WHO regularly evaluating ways to improve ANC for women in LMIC, improved understanding of potential benefits or drawbacks of the group-care model provides critical and timely insight. The rigorous study design of this cRCT makes it well-positioned to inform the next round of WHO ANC guidelines.

Results from the detailed analyses undertaken by this study provide insight specifically to *how* group ANC and PNC influences women's intentions for PPFP, understanding of postpartum fertility return, and contraceptive behaviors in the postpartum period. Qualitative methods are appropriate for gaining better understanding of how women's experiences in group care may have influenced their intentions or addressed concerns related to PPFP (Aim 1). The contraceptive calendar data collected in the 12-month postpartum survey are well-suited for survival analysis to assess how the probabilities of method uptake shift over time and whether women in group care experience shorter gaps between fertility return indicators and contraceptive initiation (Aim 2). The conceptual framework for this research rests on the hypothesis that CSE plays a vital role in taking up and effectively practicing PPFP. As no standard, context-relevant measure for this concept existed prior to this study, the present research fills a measurement gap by validating a recently developed scale to measure CSE in SSA (the CSESSA scale).

Having this validated measure of CSESSA will strengthen research in this field by providing a standard tool that can be used elsewhere; this is a key contribution of this dissertation.

Limitations

This research has several limitations. First, there are limitations related to the intervention itself. During study enrollment women who refused group care at intervention facilities were not enrolled. It is possible that women who accepted to participate in group care were different in some way compared to women who refused to participate, which would indicate self-selection bias. Analysis of non-identifiable data on sociodemographic characteristics collected prior to enrollment indicated that self-selection bias was not significant. Also, as part of the intervention, providers at intervention facilities went above and beyond to ensure women could attend sessions. Due to the relationship developed at group care, providers and patients exchanged contact information, and it was not uncommon for providers to reach out to women to encourage attendance. Although this is a key component of the present intervention, it may not be feasible or sustainable long-term. This extra attention may influence women's outcomes in a way that would not occur in a non-study environment.

The research methods in this dissertation have limitations. Qualitative data cannot be used to determine causality. Although qualitative findings may provide insight to what influences PPFP intention and use, this data cannot be used to test the strength of relationship or temporal conditions for causality. Data from the contraceptive calendar are collected at 12 months postpartum, and as such are subject to recall bias. It is possible that women made errors when recounting contraceptive behavior from months ago, and it would have been preferable to collect data on method use prospectively as uptake occurred. Furthermore, having final data collection occur at 12 months postpartum leads to right-censoring of data from women who began using contraception after this time point. In our results, we may consider that a participant failed to take up contraception while in reality she may have started a method following data collection. Similarly, we lack the ability to assess method switching and discontinuation due to inability to capture outcomes that occur after 12 months postpartum. Women are likely to practice LAM up to 6

months postpartum leaving a small window of time for uptake of another modern method, switching, and/or discontinuation from 6-12 months postpartum. Since it is assumed that much switching is unlikely in the study period, and this study lacked power to test for differences in survival functions specific to the outcome of switching, it was therefore not included in survival analysis.

Lastly, since this research aimed to validate a measure for CSESSA, data from the scale items have limited utility in assessing the role of CSE in the present study. It is not possible to assess whether the intervention affected women's CSE over time, since this scale was only administered in the final survey. In future research, the validated measure should be administered before and after an intervention to provide insight to any changes that may occur. Additionally, the CSESSA scale was piloted and validated among a sample of postpartum women. This scale is designed to measure the contraceptive self-efficacy among women without regard to pregnancy status and therefore should also be tested among a more heterogenous group of women.

Policy, Program, and Research Implications

Policy implications

Findings from this dissertation have policy applications. Given that Kaplan-Meier results indicate that women in group care have increased likelihood to uptake PPFP across the postpartum period, and that both providers and women prefer group to individual care, the governments of Kenya and Nigeria may consider changing policy to encourage this service delivery model. Local governments in Kisumu and Machakos counties and Nasarawa State may serve as examples for a policy shift. Nasarawa State has already included scale up of group care in its 5-year Health Development Plan. It is possible that widespread utilization of this model could help to move Nigeria closer to meeting it's Family Planning 2020 goal, and Kenya closer to fulfilling unmet need among postpartum women.

Findings from this study highlight how facilitated discussions on contraception serve to compliment standard contraceptive counseling in ANC, PNC, and beyond. The benefits of multiple

contraceptive discussions in the context of ANC have been quantified elsewhere; however, similar results from this large cRCT may carry more weight to influence policy on the timing and frequency of contraceptive discussions during pregnancy and the first year postpartum. Qualitative findings suggest that women who participated in facilitated group discussions were better informed and prepared for contraceptive decision-making in individual contraceptive counseling sessions. These findings also provide insight to benefits and drawbacks to group-based contraceptive discussions in this setting, including key components of group care that ensure participant confidentiality and provider discretion for sensitive questions (for instance, use of the "wonder basket").

Recently the WHO released guidelines that recommend eight, rather than four, ANC visits for improved birth outcomes and experience of care [10]. Given the low levels of utilization of ANC and PNC across LMIC settings, it is difficult to fathom women attending the recommended number of visits without a compelling change in protocol. The group care model has already shown to be feasible and acceptable in several LMIC settings and increases in ANC and PNC attendance are noted. Findings from this dissertation contribute to the growing body of evidence in favor of group care for its effect on key maternal health outcomes, including PPFP. This research should therefore be used to inform the WHO's recommendations on group care leading into the next round of ANC guidelines.

Program implications

Findings from the qualitative analysis identify the processes by which programs can engage women to influence their intention for PPFP and to address women's concerns about side effects of various family planning methods. Similarly, enhanced understanding of the timing of contraceptive uptake over the first 12 months after delivery can be used by programs to proactively plan and identify time points for outreach to postpartum women. Programs implementing a group-care model can learn from the findings of this research to improve outcomes among future participants.

At a programmatic level, the CSESSA scale may be used to evaluate and improve interventions aimed at increasing CSE and contraceptive initiation. For example, use of the full scale can indicate if CSE needs to be addressed in conjunction with other health system issues that may be impacting contraceptive access. Individual item analysis can also guide service providers and stakeholders in identifying specific actions associated with contraception adoption and practice for which women have low self-efficacy. This information will allow more precise prioritization of programmatic focus, potentially resulting in a more effective and efficient improvement process.

Research implications

Results from this dissertation have implications for future research. While the qualitative findings from chapter 4 lend insight to the processes by which group ANC and PNC may influence PPFP, a next step could include carefully planned quantitative research, in the context of an evaluation, to reveal whether fidelity to the identified process is truly necessary to influence PPFP. Additionally, although this research found that most women's concerns about contraception were addressed in group, for a subgroup of women this did not occur. Further investigation is warranted to identify best practices for addressing concerns and fears about contraception among women with similar reservations. Findings from chapter 5 point to a need for improved comprehension among researchers, programmers, and providers on how to promote postpartum women's understanding of return to fertility. Given that many programs emphasize LAM for PPFP, it could be useful to assess whether LAM-specific counseling influences effective LAM practice or increases use of other contraceptive methods. There is a need to fill the void in research exploring the relationship between postpartum women's understanding of fertility return and contraceptive use (including LAM). Lastly, while chapter 6 presents a reliable and valid scale in the two study settings, further research is warranted. The reliability and validity of the CSESSA scale and sub-scales should be assessed further among women of reproductive age across SSA, to confirm or refute the measure's applicability for women outside of the postpartum period. The two versions of the CSESSA

scale should be tested in other low and high mCPR settings to determine whether they truly reflect this construct by mCPR.

Summary

This dissertation investigated the ways in which group ANC and PNC sessions influenced PPFP intention and behavior among women in Kenya and Nigeria. It also produced a validated measure for a key concept of interest: contraceptive self-efficacy among women in sub-Saharan Africa. By shedding light on the processes through which group care influenced contraceptive behaviors, this research not only contributes to the growing body of evidence in favor of this model of care, but it specifically highlights key components of group care that influence PPFP.

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Study Abroad, Mali: Independent qualitative study on the role of women in development in Mali

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- Design and instruct an innovative 16-week undergraduate course titled *Reproductive health in crisis: issues in meeting the needs of vulnerable populations.* First-ever offering of this course. Spring and Fall semesters 2018
- Develop curriculum to fill a gap in public health education for students interested in the reproductive health of persons affected by crises. Utilize a health-systems framework to guide students to identify vulnerabilities that may threaten reproductive health during a humanitarian crisis. Certify students in the Minimum Initial Service Package for Reproductive Health in Crisis (MISP)
- Using case studies, familiarize students with key reproductive health issues as well as evidence-based interventions that save maternal and newborn lives. Challenge students to consider creative solutions to improve patient outcomes in unstable contexts

Thesis Committee Member Sep. 2017 – Jun. 2018
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Teacher: English for Childcare, English as a Second Language, Financial Literacy May 2010 – Jul. 2012
St. Vincent Catholic Charities, Refugee Services, Lansing, MI

- Integrate health, nutrition, safety, business, and child development topics into ESL program. Develop curriculum that prepared refugee women for health department certification as independent childcare providers
- Teach and manage classes of 12-20 women from various language groups with their children present.
- Coordinate project management and analysis; conduct grant reporting, write grant proposals to secure funds
- Instruct non-English speakers in activities to foster English proficiency; develop curriculum focused on job readiness
- Manage Financial Literacy program: hire and supervise interpreters, uphold grant requirements and reporting mandates

RESEARCH AND PROGRAM EXPERIENCE

Dissertation Research Sep. 2017 – Mar. 2020
Postpartum family planning among women attending group-based antenatal and postpartum care in Kenya and Nigeria: a cluster Randomized Control Trial
Parent study conducted by Jhpiego Kenya and Nigeria from Jan. 2017 – Nov. 2018

- Develop family planning sections of interview guides for focus group discussions and in-depth interviews with providers of group care and study participants to explore how group antenatal and postpartum care experiences: 1) influence women's intention to use postpartum family planning and 2) address concerns about side effects of using various contraceptive methods
- Perform qualitative analysis in Atlas.ti software in collaboration with Kenyan colleagues using an inductive content analysis approach and thematic abstraction
- Prepare family planning sections for survey administered to all participants at 12 months postpartum
- Conduct survival analyses in Stata including Cox proportional hazards regression, log-rank tests, lifetables, and Kaplan-Meier curves to investigate time to modern contraceptive uptake between control and intervention groups. Sub-analyses explore time to contraceptive uptake after key return to fertility indicators (menses return and exclusive breastfeeding, separately) comparing study groups
- Investigate understanding of criteria for the lactational amenorrhea method (LAM), receipt of information on exclusive breastfeeding from a health provider, and actual LAM practices comparing study groups, using the t-test for difference in proportion
- Develop scale, in collaboration with colleagues in Kenya and Nigeria, to measure Contraceptive Self-Efficacy among women in Sub-Saharan Africa (the CSESSA scale), for which no measure currently exists
- Assess the reliability, fit, and structure of the CSESSA scale independently for Kenya and Nigeria using psychometric methods including exploratory factor and reliability analysis
- Validate the CSESSA scale by assessing the area under the curve (AUC) of a receiver operating characteristic (ROC) curve to assess the predictive capability of the mean CSESSA score against current modern contraceptive use, and using logistic regression of CSESSA score against current modern contraceptive use

Research Consultant May – Jun. 2019
Women's Refugee Commission, New York, NY

- Conduct data analysis and write final report for a qualitative program evaluation exploring the outcomes of married adolescent girls reached by the International Recue Committee's programs for married girls in Lebanon
- Lead author on upcoming manuscript *When a woman has faith in herself, she will be able to achieve anything: Evaluation of an intervention for married Syrian adolescent refugee girls living in Lebanon*

Intern, Group Antenatal Care Cluster Randomized Trial Jan. – May 2019
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- Conduct qualitative and quantitative analyses using data from a large cRCT on group-based versus standard antenatal and postpartum care in Nigeria and Kenya. Assess study outcomes related to women's experience of care, postpartum family planning, and malaria in pregnancy
- Contribute to study manuscripts and reporting

Research Assistant, Bill & Melinda Gates Institute for Population and Reproductive Health Apr. – Dec. 2018
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- Facilitate planning and preparations for the 2018 International Conference on Family Planning held in Kigali, Rwanda November 12-15, 2018, which was attended by over 4,500 researchers from around the world
- Oversee various conference activities, including the Young Researcher Travel Awards and the Awards for Excellence in Leadership for Family Planning
- Lead youth preconference session on evaluating scientific posters
- Moderate focus group discussion to gain understanding of youth experiences as part of conference evaluation
- As a conference participant: 1) organize and chair a panel on the perinatal service provider's role in addressing women's concerns about postpartum family planning and 2) present findings related to contraceptive self-efficacy measurement in an oral session

Research Consultant, Johns Hopkins Fertility Center Feb. – Dec. 2018
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- Conduct statistical analyses using patient data to explore the fertility preservation choices of cancer patients seeking treatment at The Johns Hopkins Hospital between 2001-2017
- Perform sub-analyses to explore use of frozen embryos or oocytes among breast cancer patients
- Assess associations between endometrial cancer treatment type and patient outcomes over the study period
- Advise physicians on protocol and tool development for a qualitative study investigating young cancer survivors' knowledge and feelings regarding their cryopreserved ovarian tissue. Lead qualitative analysis for this study and contribute to manuscript

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Johns Hopkins Bloomberg School of Public Health, Baltimore, MD
In collaboration with the Women's Refugee Commission, New York, NY

- Develop research protocol and IRB applications for a study to estimate the prevalence of child marriage in three emergency contexts: Syrian refugee tented settlements in Lebanon, Dollo Ado Camp for Somali refugees in Ethiopia, and a camp for internally displaced persons (IDPs) in Kachin State, Myanmar
- Assist with survey development and orientation in the mobile data collection platform, Magpi. Provide backstopping remotely during data collector trainings and field testing in Ethiopia and Lebanon, and in-person at trainings in Kachin State, Myanmar
- Lead training of 10 remunerators in Kachin State, Myanmar, prior to survey implementation in IDP camps
- Contribute to development of protocol and tools for a qualitative program evaluation exploring the outcomes for adolescent girls reached by child marriage programs in Lebanon
- Develop the qualitative analytical framework; assist with and advise in-country team on qualitative methods

Research Assistant, Center for Communication Programs Apr. 2017 – Apr. 2018
Johns Hopkins University, Baltimore, MD

- Perform multi-level multinomial statistical analyses to explore correlates of contraceptive method choice among Nigerian women using data from the Nigerian Urban Reproductive Health Initiative (NURHI). Contribute to the literature by investigating factors related to use of short versus long-term modern contraceptive methods
- Conduct literature review on postpartum family planning in Nigeria's private sector
- Draft and prepare manuscript for publication

Research Assistant, Social and Behavioral Interventions Sep. 2016 – May 2017
Johns Hopkins Bloomberg School of Public Health, Baltimore, MD

- Conduct statistical analyses, literature review, and manuscript development in collaboration with PhD students studying maternal health at the University of Bamako in Mali
- Provide technical assistance to support quantitative analysis skills development for PhD students at the University of Bamako

- Collaborate on studies focusing on: 1) equity and maternal health service utilization and 2) malaria in pregnancy in Mali
- Develop a wealth scale, concentration index, and concentration curve to examine inequities in maternal health care utilization among women in a rural Malian district

Program Specialist, Advance Family Planning Oct. 2014 – Aug. 2016
Bill & Melinda Gates Institute for Population and Reproductive Health, Baltimore, MD

- Maintain partner communication, documentation, and administrative activities for a nine-country advocacy initiative that achieved over 130 gains in policy change and budget allocations in favor of family planning since 2009
- Act as programmatic backstop to closely support family planning advocacy work in India, Uganda, Burkina Faso, Senegal, and Indonesia; travel to Uganda, Burkina Faso, Kenya, and Indonesia to provide technical support and conduct strategic advocacy sessions
- Manage monitoring and evaluation system for entire project; revise templates for partner quarterly report and landscape assessment documents to be more efficient, user-friendly, and informative
- Direct special events and meetings, including the annual Partners Meeting, which draws over 100 international partners and donors; manage a workshop on locally-driven advocacy for the 2015 International Conference on Family Planning in Indonesia
- Collaborate with Performance Monitoring for Action and partners to develop advocacy briefs using current data; write brief on adolescent family planning needs to influence Ugandan district health officers to make specific commitments towards improving contraceptive access and expanding the method mix for adolescents

Senior Research Program Coordinator, Social and Behavioral Interventions Jun. – Sep. 2014
Johns Hopkins Bloomberg School of Public Health, Baltimore, MD
Population Services International, Dar es Salaam, Tanzania

- Coordinate research activities for a study on malaria rapid diagnostic test use in private sectors in five endemic countries: Tanzania, Madagascar, Uganda, Kenya, and Nigeria
- Develop research protocol and study instruments; oversee initial phases of the IRB application processes
- Supervise and mentor student interns on their project-related tasks in Tanzania: lead accelerated trainings in qualitative research methods, research ethics, literature review, program monitoring and evaluation, and protocol development; ensure the application of public health principles in project activities
- Liaise with partner organizations to coordinate access to partner-collected data needed for project M&E functions
- Develop and oversee data management procedures to ensure data quality and compliance with requirements for anonymity and confidentiality of research participants
- Contribute to project reports and budgeting activities

Training Grant Coordinator, Social and Behavioral Interventions Sep. 2012 – Jun. 2014
Johns Hopkins Bloomberg School of Public Health, Baltimore, MD

- Coordinate activities for an NIH-funded Fogarty training grant to support the development of a School of Public Health at the University of Bamako, Mali; manage sub-agreement and oversee completion of milestones
- Collaborate with Malian partners to support curriculum development and visiting scholar appointments
- Contribute to grant proposals, leading to attainment of NIH funding for a community-level Mobile Health intervention aimed at improving maternal health outcomes in rural Mali
- Support research activities including instrument development for a Malaria in Pregnancy IPTp qualitative study
- Communicate routinely using oral and written French; conduct scholarly research and prepare manuscripts

Sexual and Reproductive Health Intern, Technical Division for Family Planning Oct. 2013 – Jan. 2014
United Nations Population Fund, New York, NY

- Perform a literature review on quality of care in family planning programs
- Develop a guidance document to enhance UNFPA country offices' efforts to improve quality of contraceptive care
- Collaborate with colleagues to create a unified theory of change for UNFPA's family planning programs

Master's Thesis Project Jul. – Sep.2013
Fenerive-Est, Madagascar
A qualitative exploration of village-level uterotonic practices in Fenerive-Est, Madagascar

- Create an independent study to better understand use of herbal teas for uterotonic purposes in villages where a community-based misoprostol distribution was being piloted for prevention of postpartum hemorrhage
- Write all study documents, including protocol, informed consent forms, and in-depth interview guides. Hire interpreter and supervise translation of all study materials into French and Malagasy
- Oversee submission of research protocol to the Ministry of Health in Antananarivo, Madagascar, and virtually to the IRB at Johns Hopkins Bloomberg School of Public Health. Receive approval for study
- Conduct 12 in-depth interviews with traditional birth attendants, community health workers, and health providers
- Establish relationship with scientist specializing in analysis of uterotonic plants at the Medical University of Vienna, Center for Physiology and Pharmacology. At interviews, collect samples of potentially uterotonic plants and ship specimens to Vienna to be analyzed for the presence of uterotonic peptides
- Code transcribed interviews using an inductive content analysis approach. Extract themes from the coded data
- Synthesize findings from qualitative research and plant analysis. Send report to the Madagascar Ministry of Health and publish manuscript

Intern, Community Based Distribution of Misoprostol Project May – Sep. 2013
MCHIP/Jhpiego, Antananarivo and Fenerive-Est, Madagascar

- Strengthen the curriculum for midwifery institutions across Madagascar by integrating a module on respectful maternity care into midwifery school curriculum; present on respectful maternity care to program staff and approximately 20 instructors of midwifery institutions
- Facilitate in-service training on essential interventions for maternal and newborn health for approximately 16 midwives
- Contribute to end of pilot-phase activities for a community-based distribution of misoprostol to prevent postpartum hemorrhage during home births: assist project staff with supervision of community health workers, postpartum interviews with study participants, data entry, cleaning, and analysis. Study results influenced the Ministry of Health to register misoprostol for reproductive health purposes
- Prepare dissemination materials, including a project brief and report for Ministry of Health

LEADERSHIP AND ACTIVITIES

Member Public Health Students for Reproductive Justice Nov. 2019 - Present
Reviewer International Journal of Women's Health Aug. 2019
Birth Doula Independent Sep. 2015 – Present
President, Founder, Member Students for Reproductive Health in Crisis, JHSPH Feb. 2017 – Present
Member Doctoral Admissions Committee, JHSPH PFRH Department Nov. 2017 – Apr. 2018
Reviewer JSM In vitro Fertilization May 2016
Director Milk Money for Mali fundraising group Jul. 2008 – Mar. 2014
Volunteer Sparrow Hospital, Neonatal ICU and Pediatric Units, Lansing, MI Jan. 2011 – Jul. 2012

- Administered therapeutic infant massage and visited with children to ameliorate hospital stays

Volunteer St. Vincent Catholic Charities, Refugee Women's Sewing Circle, Lansing, MI Jan. 2010 – Jul. 2012

- Played integral role in Post-Traumatic Stress Disorder counseling program

Vice President, Historian, Singer Ladies First All-Female A Cappella Group, MSU Sep. 2005 – May 2009

PUBLICATIONS

Collins, L., Mmari, K., Mullany, L., Gruber, C., Favero, R. *An exploration of village-level uterotonic practices in Fenerive-Est, Madagascar.* BMC Pregnancy and Childbirth. April 2016.

Wu, H., Yin, O., Monseur, B., Selter, J., Lau, B., **Collins, L.**, Christianson, M. *Lesbian, Gay, Bisexual, Transgender Content on Reproductive Endocrinology and Infertility Clinic Websites.* Fertility and Sterility. April 2017.

Noguchi, L., Grenier, L., Kabue, M., Ugwa, E., Oyetunji, J., Suhowatsky, S., Onguti, B., Orji, B., **Whiting-Collins, L.**, Adetiloye, O. *Effect of group versus individual antenatal care on uptake of intermittent prophylactic treatment of*

malaria in pregnancy and related malaria outcomes in Nigeria and Kenya: analysis of data from a pragmatic cluster randomized trial. Malaria Journal. January 2020.

Cordeiro Mitchell, C.N., **Whiting-Collins, L.**, Christianson, M.S. *Understanding Patients' Knowledge and Feelings Regarding Their Cryopreserved Ovarian Tissue: A Qualitative Interviewing Study.* Journal of Adolescent and Young Adult Oncology. April 2020.

Babalola, S., **Collins, L.**, Speizer, I., Long, E., Akiode, A., Odeku, M. *The importance of community variables in contraceptive method choice: a multilevel multinomial regression.* (Currently under review for publication in Population Horizons)

Cordeiro Mitchell, C.N., Hunkler, K.F., Maher, J.Y., Garbose, R. A., Gornet, M.E., **Whiting-Collins, L.J.**, Christianson, M.S. *Conservatively Treated Endometrial Intraepithelial Neoplasia/Cancer: Risk of Intrauterine Synechiae.* (Currently under review for publication in the International Journal of Gynecological Cancer)

Whiting-Collins, L., Grenier, L., Winch, P.J., Tsui, A., Donohue, P.K. *Measuring contraceptive self-efficacy in sub-Saharan Africa: development and validation of the CSESSA scale in Kenya and Nigeria.* (Currently under review for publication in Contraception X)

PRESENTATIONS

Nyehoora Mugumya, K., Tumukurate, E., Apira, P., Badaru, D., **Collins, L**. *Leveraging the Private Sector to Achieve Contraceptive Security: Uganda's Alternative Distribution Strategy.* Accepted for oral presentation at the International Conference on Family Planning in Nusa Dua, Indonesia, November 2015.

Cordeiro Mitchell, C. N. Maher, J.Y., Hunkler, K., Garbose, R., **Collins, L.J.**, Christianson, M.S. *Conservative treatment for endometrial cancer and complex atypical hyperplasia: risk of intrauterine synechiae.* Accepted for oral presentation at the ASRM 2018 Scientific Congress in Denver, Colorado, October 2018.

Maher, J.Y., Cordeiro Mitchell, C.N., Hunkler, K., Gornet, M., Garbose, R., **Collins, L.**, Christianson, M.S. *Fertility preservation decision-making prior to gonadotoxic treatment: an analysis of 451 patients.* Accepted for poster presentation at the ASRM 2018 Scientific Congress in Denver, Colorado, October 2018.

Maher, J.Y., Cordeiro Mitchell, C.N., Hunkler, K., Gornet, M., Garbose, R., **Collins, L.**, Christianson, M.S. *Fertility preservation in breast cancer patients over a 16-year period: low subsequent utilization of cryopreserved embryos or oocytes*. Accepted for poster presentation at the ASRM 2018 Scientific Congress in Denver, Colorado, October 2018.

Collins, L., Grenier, L., Ogunti, B., Oyetunji, J. *Measuring Contraceptive Self-Efficacy in Sub-Saharan Africa: piloting the CSESSA Scale.* Accepted for oral presentation at the International Conference on Family Planning in Kigali, Rwanda, November 2018.

Onguti, B., Grenier, L., Suhowatsky, S., Odunlami, T., Karnad, S.R., **Collins, L.**, Wambua, J. *Finding the time: Addressing PPFP in ANC through group-based care*. Accepted for poster presentation at the International Conference on Family Planning in Kigali, Rwanda, November 2018.

Karp, C., Schlecht, J., **Collins, L**., Myers, A., Abdu, A., La Rip, L., Krause, S., Robinson, C. *Reproductive health and service knowledge of adolescent refugees and internally displaced persons (IDPs) in Ethiopia, Lebanon, and Myanmar.* Accepted for oral presentation at the International Conference on Family Planning in Kigali, Rwanda, November 2018.

Collins, L., Nimbu, L., Burke, A., Oluyemisi Don-Aki, J. *Seizing an Often-Missed Opportunity: The Perinatal Service Provider's Role in Addressing Women's Concerns About Contraceptive Side Effects*. Organized and served as session chair for preformed panel at the International Conference on Family Planning in Kigali, Rwanda, November 2018.

Babalola, S., **Whiting-Collins, L**., Speizer, I., Cobb, L., Akiode, A., Odeku, M. *The importance of psychosocial and community variables in contraceptive method choice: a multilevel multinomial regression.* Accepted for oral presentation at the 70th Annual International Communication Association Conference, Gold Coast, Australia, May 2020.

Whiting-Collins, L. Metzler, J., Tawk, M., Karp, C., Robinson, C. *A journey of empowerment for refugee girls to address child marriage in Lebanon: findings from a formative program evaluation.* Accepted for oral presentation at the North American Refugee Health Conference, Cleveland, Ohio, August 2020.

AWARDS

Fund in Recognition of Laurie Schwab Zabin	2019
Kann Trowbridge Fund	2018
Gordis Teaching Fellowship	2018
Fellowship in Family Planning	2017
Josephine Kohn and Family Fund	2016
Masters Thesis Awarded with Distinction	2014
Johns Hopkins University Student Employee of the Year Nomination	2014
Global Health Established Field Placement in Madagascar	2013
MSU College of Social Science Study Abroad Grant	2008
William Davidson Award	2008
Madenberg Scholarship	2008
James Madison College Study Abroad Scholarship	2008
MSU Endowed Scholarship for Study Abroad	2008
Tower Guard, a service-oriented honors society serving the needs of students with disabilities at Michigan State University	2006 – 2007

LANGUAGE SKILLS

Intermediate: French
Beginner: Spanish
Exposure to local languages while living abroad (took lessons): Bambara, Malagasy, Swahili

COMPUTER SKILLS

- Experienced with Stata, Atlas.ti, Dedoose, Excel, web database research, and literature review
- Familiar with SPSS and R
- Proficient in Microsoft Word, PowerPoint

PROFESSIONAL MEMBERSHIPS

Member Population Association of America	Jan. 2020 – Present
Member Society of Refugee Healthcare Providers	Dec. 2019 – Present
Member International Union for the Scientific Study of Population	Mar. 2019 – Present
Member Interagency Working Group on Reproductive Health in Crisis	Sep. 2012 – Present

PROFESSIONAL DEVELOPMENT

- Johns Hopkins University Teaching Academy — Present
- CITI course in Human Subjects Research: Responsible Conduct of Research — Feb. 2018
- CITI Human Subjects Research Recertification — Jan. 2018
    - Refresher Course - An Overview of Research with Vulnerable Subjects